

Commission on Educational Technology



State Plan to Implement Technology to Support Student Learning

November 26, 2001

**Prepared by Department of Education
and
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Acknowledgments

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A special note of appreciation is extended to the Nevada Educational Technology Consortium. They devoted their time and energy to completing surveys and site visits, and for supplying other information, often on a moment's notice.

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I. Executive Summary

A. Commission on Educational Technology

Although norm-referenced student test scores are not expected to increase immediately as a result of technology implementation, they are expected to increase over time. The public and the legislature expect schools to gather and analyze a variety of indicators that will demonstrate the impact of technology on student achievement and clarify questions effective strategies. The financial and human investment required to achieve this future is considerable. However, the returns for students and teachers, as well as the public, are substantial. The educational community must work together with government, business and industry to find the resources that will be needed. Finally, progress must be carefully monitored and evaluated to ensure that all students' needs are addressed, that resources are wisely allocated, and that improved student achievement remains the focus of everyone's collective efforts. These are complex goals that may involve many individuals and have price tags beyond what might be considered affordable.

The creation of the Nevada Education Reform Act of 1997 (NERA) by the state legislature placed an emphasis on education, including technology. NERA supports a standards-based curriculum that focuses on improving student achievement and the integration of technology into the classroom. The intent of the legislation was to make technology a part of classroom instruction, provide access to valuable information, and enhance the technology skills for the workforce of the future.

From NERA came Senate Bill 482, which in part amended NRS 388. Senate Bill 482 formed the Commission on Educational Technology. The Commissioners are appointed by the Governor and legislative leaders and represent business, schools, libraries, parents, the university system and the legislature. In addition to the appointed members, there are two ex-officio members, the State Superintendent of Public Instruction and the Director of the Department of Information Technology. Each member has a term of two years and may be re-appointed with no limitation on the number of terms they may serve.

Senate Bill 482 set out specific tasks for the Commission to accomplish:

- The Commission shall establish a plan for the use of educational technology in the public schools, submit it to the governor and review the plan annually.
- The Commission shall develop technical standards for educational technology and any electrical or structural appurtenances necessary.
- The Commission shall allocate money to the school districts from the Trust Fund for Educational Technology.
- The Commission shall establish criteria for the board of trustees of a school district that receives an allocation of money from the Commission.

B. Technology Plan Goals

The Commission's intent in preparing this state plan is to help districts make more rapid and successful progress in achieving the integration of technology into the educational experience of all students.

The Nevada Commission on Educational Technology developed four main goals for the successful integration of technology into the curriculum:

- **The technology infrastructure supports appropriate access for all students and teachers, regardless of their geographic location;**
In the past, many schools and districts did not budget for the repair and maintenance needs of equipment purchased from one-time resources. The significant investment made by taxpayers of Nevada requires that it be protected by the identification of an on-going funding stream to pay for repair and maintenance needs. Even with the investment made by Senate Bill 482, Nevada will still rank behind other states in the ratio of students to computer. To be able to have reasonable expectations about technology impacting student learning, Nevada needs to continue to invest in building the availability of multimedia computers in schools.
- **High-quality content materials are available to support a standards-based curriculum;**
As new academic standards are adopted per Senate Bill 482 (Chapter 473, Statutes of Nevada, 1997), a statewide effort to redesign curriculum will be needed. This will be an opportune time to work closely with the Nevada Council to Establish Academic Standards to determine how technology can be integrated into the curriculum. As more students and teachers gain access to the Internet and other technologies during the same time frame, there will be an increasing need to identify and obtain high-quality instructional materials in support of the new curriculum in a variety of formats.
- **Integration of technology into the new standards-based curriculum is achieved through a strong professional development program;**
Teachers need access to technology and support for their own learning that will enable and empower them to integrate technology into their teaching and learning strategies. Distance learning can play an important role in delivering professional development to remote areas in Nevada.
- **Timely technical support is available for teachers, students and staff.**
As more technology is poured into public schools, the need grows to provide competent, reliable support for teachers and students.

C. Levels of Technology Integration

To help legislators focus on the most serious needs and key lever points that might make a difference in causing significant movement in bringing technology to every child in Nevada., the Commission has established standards for implementing technology in schools (Exhibit 1). These standards first define what teachers and students should be able to do with technology and then establishes three levels of technology use.

- Level 1 establishes a minimum level of technology as one multi-media computer in each instructional area or the equivalent, connected to the Internet, with supporting resources, professional development and evaluation.
- Level 2 focuses on curriculum integration, extends professional development and evaluation to become focused on student achievement, and
- Level 3 defines a technology-rich environment that fully supports student learning using technology, and represents the full-integrated classroom.

The Commission's objective in allocating the Section 61 funding was to enable as many schools as possible to reach Level 1. The focus of this plan, therefore, is to ensure and to encourage schools to move beyond Level 1 to focus more squarely on the integration of the technology into the teaching and learning process at every school.

Levels of Expected Technology Integration in Nevada

| | What Students and Teachers Can Do | Networking/ Infrastructure | Hardware | Software | Evaluation |
|--|--|---|---|---|--|
| Level I (Low Tech) Highest Priority | <ul style="list-style-type: none">• Students have at least one hour of direct use of technology per week.• Teachers have access to a computer, printer, video display device and VCR• Teachers receive 1/2 hour a week of basic training in the use of technology.• Teachers use technology to manage instruction and communicate with parents. | <ul style="list-style-type: none">• Equivalent of Web/Internet access available in each classroom.• Equivalent of Video and television technology available in each classroom. | <ul style="list-style-type: none">• Equivalent of at least one network computer capable of Web/Internet access.• Equivalent of at least one network computer has sufficient memory to run up-to-date multimedia learning software. | <ul style="list-style-type: none">• Classroom computers have up-to-date networking and operating system software.• Classroom computers have up-to-date productivity software.• Classroom should have access to video resources.• Web browser software available in all classrooms. | <ul style="list-style-type: none">• Completion of installation of a networked computer and other video support technologies in each classroom.• Students and teachers successful completion of a baseline test on technology concepts, applications and skills. |

| | What Students and Teachers Can Do | Networking/ Infrastructure | Hardware | Software | Evaluation |
|--------------------------------|--|--|--|---|--|
| Level II (Mid Tech) | <ul style="list-style-type: none"> ● Students have at least two hours of direct use of technology in the classroom per week. ● Teachers have access to a computer, printer, video display device and VCR in their classroom. ● Teachers have training in basic technology received and are continually acquiring skills and in instructional applications. ● Students and teachers use technology for some presentations, projects and desktop/online publishing. ● Technology is integrated into the curriculum, as appropriate. | <ul style="list-style-type: none"> ● Web/Internet access is available on more than one computer in each classroom. ● Video and television technology available in each classroom. ● Each room should have access to networked educational resources. ● Connectivity supports student and teacher interactivity. ● Connectivity supports improved communication with parents. ● There is one technical support person for every 100 teachers. | <ul style="list-style-type: none"> ● There is at least a ratio of five students to each computer in each classroom. ● All classroom computers are capable of Web/Internet access. ● All classroom computers have sufficient memory to run up-to-date multimedia learning software applications. | <ul style="list-style-type: none"> ● All classroom computers have up-to-date networking and operating system software. ● All classroom computers have up-to-date productivity software. ● Classroom should have access to video resources. ● Some curriculum-related instructional software available. ● E-mail available in all classrooms. | <ul style="list-style-type: none"> ● Students and teachers demonstrate minimum computer literacy. ● The following areas are expected to show improvement: <ul style="list-style-type: none"> -Student attendance -Truancy statistics -Discipline referrals -Classroom participation -Student performance -School performance -Curriculum improvement ● District and school accountability information published on the district Web site. |

| | What Students and Teachers Can Do | Networking/ Infrastructure | Hardware | Software | Evaluation |
|----------------------------------|---|---|---|---|--|
| Level III (High Tech) | <p>Teachers, students, administrators and parents communicate via technology.</p> <p>Teachers and students can select appropriate technology tools and resources when they've determined technology is useful</p> | <p>All district buildings are connected through a district WAN.</p> <ul style="list-style-type: none"> – All classrooms are connected to the district WAN via school LAN's. <p>Classrooms have access to worldwide library and media learning resources.</p> <p>Hardware, networking and software repairs are complete in three working days.</p> <p>There is one technical support person per every 50 teachers.</p> <p>Television-Closed Circuit installed throughout all schools.</p> | <p>There is at least a ratio of three students to each computer.</p> <p>Computers have sufficient memory and processor speed to run multimedia applications.</p> <p>Computers have network interface cards and can access and cache multimedia Web and Internet resources.</p> <p>Schools have access to multiple interactive learning technologies that integrate voice, video and data.</p> | <p>Students and teachers have access to up-to-date multimedia software.</p> <p>Students and teachers have access to Internet/Web browser and video production software needed to access multimedia resources.</p> <p>Students and teachers have access to e-mail, and district Intranet learning resources.</p> <p>Students and teachers have access to up-to-date multimedia word processing, spreadsheet, database, presentation, and desktop publication software.</p> <p>Students and teachers have access to up-to-date instructional software.</p> <p>Students and teachers have access to interactive simulation software.</p> | <p>The following areas are expected to show improvement:</p> <ul style="list-style-type: none"> -Student attendance -Truancy statistics -Discipline referrals -Classroom participation -Student performance -School performance -Curriculum improvement -Ability to use multiple technology tools. <p>In addition:</p> <p>Students can create a curriculum-related publication.</p> <p>Students can make a presentation using multimedia tools.</p> <p>Students can complete a curriculum-related project using multimedia tools.</p> <p>District and school accountability information is published on the district Web site.</p> |

II. Commission on Educational Technology

Senate Bill 482, enacted by the 1997 legislative session, provides a blueprint for significant educational reform in Nevada to support a standards-based curriculum that focuses on improving student achievement. In that legislation it was noted that Nevada students must be able to perform at high levels of academic achievement to participate in the global economy of the 21st Century. In addition to establishing high academic standards in all core curriculum areas, the statute provides for the incorporation of technology into the teaching and learning of every school to support student learning. The intent of the legislation is clearly to make technology a part of classroom instruction, provide access to valuable information, and provide the means for the workforce of the future to enhance or extend their knowledge and skills.

To carry the torch for the integration of technology in Nevada public schools, Senate Bill 482 established the Commission on Educational Technology (CET or the Commission hereafter), an eleven-member board composed of educators, parents, business leaders, and legislators. The Commission is charged both with establishing a plan for the future direction of educational technology in the State, and with overseeing the allocation of funding immediately available through Senate Bill 482. The Commission must be a leader as well as a monitor in carrying out these responsibilities. The Commission also has responsibility for establishing statewide technical standards for hardware, software and wiring. (See Appendix D for technical standards.)

A. Mission Statement

The mission of the Commission on Educational Technology is to establish a statewide plan for using technology as a tool to improve instruction and increase academic achievement of the children in Nevada's public schools and to allocate funding available for educational technology in a manner that best serves Nevada's schools and libraries. The plan will guide the State Department of Education and school districts in using available resources efficiently and effectively to increase students' and teachers' access to technology, expand the use of technology in the classroom, teach students skills demanded in the workplace, train teachers to integrate technology into their instructional programs, and evaluate the effect of technology upon learning.

In addition to the above, to assist the Department and school districts with budgeting and purchasing decisions, the Commission will develop technical standards for educational technology and uniform specifications for computer hardware and wiring to ensure compatibility and connectivity of equipment. The Commission will review the statewide plan annually and revise it when necessary.

B. Goals Statements

The primary focus of the Commission on Education Technology shall be to provide our children with the tools and techniques they need to enter the world of the twenty-first century through the application of appropriate technology to improve the teaching and learning environment and to increase pupil achievement. Technology has fundamentally transformed the workplace during the recent period of American history; however, its full impact has not been felt in all the nation's classrooms.

The following goals relate directly to the two primary duties of the Commission - the planning/standardization function and the distribution of education technology funds.

Goals Relating to Establishing Technology Plan and Standardization:

The Commission must establish a statewide plan and associated policies for the effective use of current and future technology within Nevada's system of public education. The plan must form the foundation for state and school district utilization of technology within the classroom and guide future budgeting and purchasing decisions. The plan will also guide educators in technology-relevant issues in choosing instructional methods and materials, in developing curricula, and in training and hiring teachers.

The Commission must ensure that school district technology plans are part of an overall district plan to improve pupil achievement. Just as the statewide technology plan is part of the state's overall strategic reform effort to increase pupil achievement, district level technology plans should be part of an overall district strategic plan for improving student achievement. As a part of the Nevada Education Reform Act, the Commission will provide a blueprint for extensive and effective utilization of computers, networking, and other programs to support a broad program of curricular and systemic reform. The role of technology within the broader context of the reform effort is to act as a catalyst that, when combined with other reform efforts, will help schools to successfully attain the new state educational goals and standards.

In writing the statewide technology plan and distributing funds, the Commission must emphasize the importance of successful integration of technology in the classroom. Targeting the effective utilization of technology within the classroom will serve as a key to successful implementation. District plans should be encouraged to include strategies that involve linkages to specific classroom procedures, such as evidence

that teacher training programs focus on developing lesson plans that integrate technology into existing curricular frameworks.

Goals Relating to Formulating Policy for Distribution of Education Technology Funds:

As provided by statute, the Commission will determine the distribution of education technology funds under its authority in accordance with the technological needs and the relative wealth of Nevada's school districts, libraries, and youth training centers. All funding decisions will be predicated upon the applicant's projected ability to improve student achievement and their commitment to measure and report such an improvement. Allocations shall be made after a prudent evaluation of applications based upon the Commission's priorities, the applicant's fiscal capacity and need, and the merits of the applicant's plan.

The Commission shall adopt policies and make funding choices that encourage libraries, school districts, and youth training centers to coordinate all future budgeting and expenditure decisions within a single plan, regardless of funding source. Multiple funding streams and other resources should be coordinated within the technology planning framework.

III. Vision for Technology-Supported Student Learning

Technology-supported student learning is part of the new basics required for participation in the Information Age. If Nevada's youth are to compete equally with youth from other states and nations in the global economy of the 21st Century, it is imperative they have the technology and information literacy skills they will need to be successful. Technology, as a tool to support student learning, can give all students, including students with disabilities and those traditionally underserved, the chance to master basic skills in the core academic areas, and opportunities to apply those skills in project-based activities, using video, the Internet and other print and non-print resources, to provide them with personal learning experiences that are meaningful to them. Teachers must be empowered to support all student learning, including students with disabilities and those traditionally underserved, with professional development that focuses on integrating technology, along with the new standards, into their teaching and learning strategies for the new curriculum. School administrators must be recognized as leaders in building a strong school culture that supports technology as a tool to engage students in their learning activities. And parents play a crucial role in incorporating technology into the curriculum by understanding and supporting efforts to bring schools into the Information Age. Students, staff, and families must have the information literacy skills to be life-long learners who can renew or extend their knowledge and skills, as needed, to participate in the workforce of the future.

The financial and human investment required to achieve this future is considerable. However, the returns for students and teachers, as well as the public, are substantial. The educational community must work together with government, business and industry to find the resources that will be needed. Finally, progress must be carefully monitored and evaluated to ensure that all students' needs are addressed, that resources are wisely allocated, and that improved student achievement remains the focus of everyone's collective efforts.

IV. Goals for the Use of Technology to Support Student Learning in Nevada

The Commission's mission under Senate Bill 482 was to develop a state plan, establish standards for technology use by schools, and allocate funding to districts provided in the bill in a manner that would support the districts and schools in greatest need. Part of their function as a Commission is to establish goals by which the progress of schools in implementing technology to support student learning may be gauged. The vision put forth by the Commission requires a commitment and agreement to advocate and promote these goals in support of schools and districts.

Goal 1: The statewide technology infrastructure for K-12 supports appropriate access for all students, including students with disabilities and those traditionally underserved, and teachers in Nevada public schools, regardless of their geographic location or economic status.

- a) Multiple uses and forms of technology (including video capability) are used in all instructional areas (including library/media centers) to accommodate different learning styles and anywhere, anytime learning.
- b) Voice/video/data integrated networks are widely available to K-12 throughout the state.
- c) All video resources are in digital format.
- d) Network bandwidth is sufficient to support video in classrooms and library/media centers.
- e) Satellite downlinks are widely available and used by schools.
- f) Parents have access to on-line information about their children and their learning.
- g) In the past, many schools and districts did not budget for the repair and maintenance needs of equipment purchased from one-time resources. The significant investment made by taxpayers of Nevada requires that it be protected by the identification of an on-going funding stream to pay for repair, maintenance, upgrading needs.
- h) A K-12 telecommunications plan should be developed and implemented to address the goals identified in this plan. (See Recommendation E under Supporting Technology Integration for further details.)

Goal 2: High-quality content materials are available and accessible to both students and teachers to support a standards-based curriculum.

- a) Technology-supported materials and resources that address state standards for academic areas are used by all teachers to plan for instruction.
- b) Every student, including students with disabilities and those traditionally underserved, regardless of location, has access to the content and curriculum they need to meet state standards for graduation, to enter the world of work, or to meet college entrance requirements.
- c) Learning takes place in both virtual and physical learning spaces across the state.
- d) Model classrooms/programs have been developed to support professional development for teachers, and are open and available for teachers to visit and observe.
- e) Textbooks are readily available in electronic format to provide students and teachers with up-to-date instructional materials on a timely basis; and access to information databases will supplement library books and reference materials.
- f) Student assessments, in a variety of formats, are collected and analyzed at the school, district and state levels to understand and document the impact of a technology on student learning.
- g) All schools and districts have acceptable use policies, copyright infringement regulations, and other policies needed to ensure the ethical use of information resources.
- h) Districts will need to redesign their curriculum utilizing the new state standards in each subject area and technology should be considered as an integral part of that curricula. A statewide collaborative effort to do this will be a cost effective way to ensure that students located in small, rural districts have access to a high quality curriculum.
- i) The number of teachers and students, including students with disabilities and those traditionally under-served, that actively use the Internet must be increased as rapidly as possible, while ensuring that young students are exposed only to developmentally appropriate instructional materials and activities.

Goal 3: Integration of technology in the curriculum is achieved through a strong professional development program.

- a) Professional development opportunities, delivered in a variety of formats, are available that support getting started with technology, integrating technology, and leading with technology.
- b) Incentives must be found to encourage staff participation in professional development in support of technology integration such as:
 - i) A low cost technology purchase program for teachers and administrators
 - j) Substitutes for teachers so they can visit model classrooms/programs to help them learn how to integrate technology
 - k) Stipends to support their independent efforts after hours, on weekends, or during the summer.
 - l) Professional recognition
- c) All levels of staff and community are considered as to their professional development needs for technology to support student learning (superintendents, principals, administrative staff, teachers, technology support staff, parents, students, community, and business.)
Administrative leadership and participation is vital to the success of any educational change effort. Administration supports and advances technology professional development in a variety of ways:
 - § By modeling or using technology in day-to-day management and learning activities.
 - § By promoting technology as a key restructuring and/or transforming tool.
 - § By recognizing and maximizing professional development opportunities to unlock the power of emerging technologies.
 - § By participating in technology-based professional development activities.
- d) Districts demonstrate their commitment to technology integration by establishing a budget line item for technology professional development.
- e) Districts work together to create a statewide community of learners teachers working together to understand and implement technology integration. Provide educators with opportunities for learning how to integrate technology into their teaching and learning strategies. Teachers should experience a hands-on process for integrating technology into the curriculum. The most effective way to successfully integrate technology into the curriculum is to create learning cultures in each school. A team approach will allow the sharing, distributing, and empowerment of all through coaching and mentoring.

- f) Teacher certification and licensing procedures have been modified to ensure pre-service and in-service technology expertise to support student learning. State licensing procedures should be modified to require that teachers and administrators demonstrate basic computer literacy for initial licensure. State continuing education requirements should be modified to require that teachers and administrators demonstrate a minimum level of proficiency in integrating technology into their teaching and learning strategies.
- g) A full-time position should be established in every district to coordinate the curriculum and professional development needs of teachers and principals to integrate technology in the curriculum. These individuals should be targeted by statewide efforts to organize and coordinate a statewide professional development program.
- h) An annual teacher conference on technology integration should be held where teachers and administrators can come together to learn from each other and from experts on how to integrate technology into teaching and learning. They can gain the skills for understanding change, learn how to lead an innovative school, create a shared vision, and apply tools for implement a well-developed technology plan.
- i) Establish a series of regional teacher development centers at targeted schools which can become models for technology integration, serve as software preview centers, and provide a rich environment for technology exploration by teachers.
- j) Develop an on-line teacher mentoring program to build a community of learners that will allow teachers and administrators to communicate with each other about the use of technology in support of student learning, including students with disabilities and those traditionally under-served. Teacher developed units of practice could be cataloged online for ease of sharing among teachers throughout the state.
- k) A statewide assessment of current teacher and administrator utilization of technology in instruction should be undertaken to form a baseline for future analysis.

Goal 4: Timely technical support is available for teachers, students and staff.

- a) On-site technical support is available to meet school and instructional needs (system analysis, software/desktop applications, network infrastructure, basic trouble-shooting, and maintenance.) Teachers need immediate support for technology implementation efforts in their classrooms, both in terms of basic troubleshooting when there are technology problems, and to mentor them in effective strategies for integrating technology in the classroom. Each school site should plan to have such a person available on a regular basis, though a full time position may not be required at the elementary level, depending on the size of the school.
- b) Districts will form partnerships with established state agencies and/or corporations to assist in providing needed support.
- c) A state help desk has been enhanced to support various environments/applications.
- d) District technical support staff must have adequate training to install and support the technology. Training in network configuration, servers and routers, and network administration are key needs. Optionally, districts may wish to consider establishing certification programs in partnership with business and industry to train youth to manage school networks, such as the CISCO program.

V. Framework of Technology Integration

As part of its charter under Senate Bill 482, the Commission has established standards for implementing technology in schools. These standards first define what teachers and students should be able to do with technology and then establishes three levels of technology use.

Level 1 establishes a minimum level of technology as one multi-media computer in each instructional area or the equivalent, connected to the Internet, with supporting resources, professional development and evaluation.

Level 2 focuses on curriculum integration, extends professional development and evaluation to become focused on student achievement, and

Level 3 defines a technology-rich environment that fully supports student learning using technology, and represents the full-integrated classroom.

The Commission's objective in allocating the Section 61 funding was to enable as many schools as possible to reach Level 1. The focus of this plan, therefore, is to ensure and to encourage schools to move beyond Level 1 to focus more squarely on the integration of the technology into the teaching and learning process at every school.

Levels of Expected Technology Integration in Nevada

| | What Students and Teachers Can Do | Networking/ Infrastructure | Hardware | Software | Evaluation |
|--|---|---|---|---|--|
| Level I (Low Tech) Highest Priority | <p>§ Students have at least one hour of direct use of technology per week.</p> <p>§ Teachers have access to a computer, printer, video display device and VCR.</p> <p>§ Teachers receive 1/2 hour a week of basic training in the use of technology.</p> <p>§ Teachers use technology to manage instruction and communicate with parents.</p> | <p>§ Equivalent of Web/Internet access available in each classroom.</p> <p>§ Equivalent of Video and television technology available in each classroom.</p> | <p>§ Equivalent of at least one network computer capable of Web/Internet access.</p> <p>§ Equivalent of at least one network computer has sufficient memory to run up-to-date multimedia learning software.</p> | <p>§ Classroom computers have up-to-date networking and operating system software.</p> <p>§ Classroom computers have up-to-date productivity software.</p> <p>§ Classroom should have access to video resources.</p> <p>§ Web browser software available in all classrooms.</p> | <p>§ Completion of installation of a networked computer and other video support technologies in each classroom.</p> <p>§ Students and teachers successful completion of a baseline test on technology concepts, applications and skills.</p> |

| | What Students and Teachers Can Do | Networking/Infrastructure | Hardware | Software | Evaluation |
|--------------------------------|--|--|--|---|--|
| Level II (Mid Tech) | <ul style="list-style-type: none"> Students have at least two hours of direct use of technology in the classroom per week. Teachers have access to a computer, printer, video display device and VCR in their classroom. Teachers have training in basic technology received and are continually acquiring skills and in instructional applications. Students and teachers use technology for some presentations, projects and desktop/online publishing. Technology is integrated into the curriculum, as appropriate. | <ul style="list-style-type: none"> Web/Internet access is available on more than one computer in each classroom. Video and television technology available in each classroom. Each room should have access to networked educational resources. Connectivity supports student and teacher interactivity. Connectivity supports improved communication with parents. There is one technical support person for every 100 teachers. | <ul style="list-style-type: none"> There is at least a ratio of five students to each computer in each classroom. All classroom computers are capable of Web/Internet access. All classroom computers have sufficient memory to run up-to-date multimedia learning software applications. | <ul style="list-style-type: none"> All classroom computers have up-to-date networking and operating system software. All classroom computers have up-to-date productivity software. Classroom should have access to video resources. Some curriculum-related instructional software available. E-mail available in all classrooms. | <ul style="list-style-type: none"> Students and teachers demonstrate minimum computer literacy. The following areas are expected to show improvement: <ul style="list-style-type: none"> -Student attendance -Truancy statistics -Discipline referrals -Classroom participation -Student performance -School performance -Curriculum improvement District and school accountability information published on the district Web site. |

| | What Students and Teachers Can Do | Networking/ Infrastructure | Hardware | Software | Evaluation |
|----------------------------------|--|---|--|--|--|
| Level III (High Tech) | <ul style="list-style-type: none"> Teachers, students, administrators and parents communicate via technology. Teachers and students can select appropriate technology tools and resources when they've determined technology is useful | <ul style="list-style-type: none"> All district buildings are connected through a district WAN. All classrooms are connected to the district WAN via school LANs. Classrooms have access to worldwide library and media learning resources. Hardware, networking and software repairs are complete in three working days. There is one technical support person per every 50 teachers. Television-Closed Circuit installed capability throughout all schools. | <ul style="list-style-type: none"> There is at least a ratio of three students to each computer. Computers have sufficient memory and processor speed to run multimedia applications. Computers have network interface cards and can access and cache multimedia Web and Internet resources. Schools have access to multiple interactive learning technologies that integrate voice, video and data. | <ul style="list-style-type: none"> Students and teachers have access to up-to-date multimedia software. Students and teachers have access to Internet/Web browser and video production software needed to access multimedia resources. Students and teachers have access to e-mail, and district Intranet learning resources. Students and teachers have access to up-to-date multimedia word processing, spreadsheet, database, presentation, and desktop publication software. Students and teachers have access to up-to-date instructional software. Students and teachers have access to interactive simulation software. | <ul style="list-style-type: none"> The following areas are expected to show improvement: <ul style="list-style-type: none"> -Student attendance -Truancy statistics -Discipline referrals -Classroom participation -Student performance -School performance -Curriculum improvement -Ability to use multiple technology tools. In addition: <ul style="list-style-type: none"> Students can create a curriculum-related publication. Students can make a presentation using multimedia tools. Students can complete a curriculum-related project using multimedia tools. District and school accountability information is published on the district Web site. |

VI. Evaluation

Short-term (one year) evaluation of results from Section 61 funding is needed to determine how much progress districts will be able to make toward meeting Level 1 objectives by the end of the school year in 1999. This will inform the Commission and the legislature on the reasonableness of their expectations for progress in meeting student achievement, teacher effectiveness and parent involvement goals. The Commission should consider a statewide strategy for conducting this evaluation that builds on the evaluation plans of each district, and includes several forms of fact finding, such as compilation of the 1999 QED survey and comparison to 1998 data, site visits to determine how districts have coordinated resources from various funding sources for technology, and teacher assessments of current technology use to form baseline expectations. This strategy should also include a review of the TerraNova test scores of schools receiving technology funding to form a baseline understanding of their current performance so that future technology implementation can be compared.

Evaluation of the impact of technology on student learning will be needed to monitor the progress schools are making in establishing an environment that supports student learning, including students with disabilities and those traditionally underserved, and that includes the identification and/or development of assessments that successfully measure student learning with technology. This long-term evaluation should incorporate the following components:

- Student assessments should be focused on the long-term impact of technology on student achievement, through information literacy and technology skill development and may include criterion-referenced tests as well as non-traditional assessments, such as portfolios and performance-based tests, or norm-referenced tests in the traditional academic areas.
- Teacher and administrator utilization of technology should be assessed on a regular basis to determine how the technology is being used to address the curriculum.
- Best practices of teaching with technology should be identified through teacher observation and model classrooms/projects that will help establish the norms for instruction using technology.

The Commission needs to develop an evaluation process to determine the impact of technology on student achievement and the school environment. In order to fully gauge the impact of technology on student achievement and the school environment a number of dimensions must be evaluated. The following dimensions should be considered to be part of a complete evaluation process. Through the development of tools/instruments and processes for each dimension, the Commission will be able to completely evaluate the impact of technology on the instructional environment and student achievement.

The six dimensions that the Commission should consider as part of a complete evaluation process are detailed below. These dimensions are based on a project from the Milken Exchange on Education Technology. The questions with each dimension are components that should be included in each evaluation process or tool/instrument.

B. Professional Competency

- m) Are the faculty and staff proficient, knowledgeable and current with technology?
- n) Has the teacher's fluency with technology translated into unique opportunities for students to learn more quickly, with more depth and understanding? Is the teacher's knowledge about technology's impact in his/her field of study reflected in the context of his/her students learning?
- o) Are teachers using technology and communication networks to advance their professional practice? Are teachers knowledgeable and current with the technology and its impact in their field of study and the larger society?
- p) Through their use of technology and telecommunications are teachers creating learning contexts that require students to take on more independent roles in their own learning?

2. Learners

- § Are learners becoming proficient using technology and communication networks for educational endeavors?
- § Does the use of technology make it possible for the learner to acquire the basic skills with more depth?
- § Does the use of technology make it increasingly possible for the learner to engage in practices that lead to new ways of thinking, understanding, constructing knowledge and communicating results?
- § Are learners using technology, communication networks and associated learning contexts to engage in relevant, real-life applications of academic concepts? Do learner work in parallel the way in which professionals in the workforce use technology?
- § Is quality access to technology and telecommunications increasing the intrinsic motivation of learners?

3. Learning Environment

- Are educators establishing a learning environment that requires and enables student teams the use of tools to research issues, solve problems and communicate results? Are educators documenting changes to student learning through anecdotal reporting?
- Do the standards, curriculum, instruction and assessment reflect the knowledge-based, global society of today?
- Is the school culture one that encourages, enables, and rewards educators and students individually and collectively to improve the learning and teaching processes through the effective use of technology and communication networks?
- Do teachers and learners have sufficient access to productivity tools, on-line services, media-based instructional materials, and primary sources of data in a setting that enriches and extends their learning goals?
- Is the learning environment a place where the effective use of information and communication technology is modeled for and by students?

4. System and Technology Capacity

- Has the system engaged key stakeholders and the broader community in defining and clearly stating a compelling vision and expectations for technology in schools? Is that vision embraced by the entire system?
- Does alignment exist between the technology plan and existing policies and practices?
- Is the district ensuring that educators and support staff have the ability to implement the technology plan into compelling and meaningful learning activities for all learners?
- Is there a team of leaders that embraces the technology plan and is in a position to facilitate the system changes that are necessary to reach the vision of the technology plan? Is the vision for improved learning through technology a design factor across the entire education system?
- Do schools have an installed base of modern technology equipment to support the learning, communication, and administrative goals of the education system?
- Is the connectivity adequate to support current and rapidly growing demands created by the learning, communication, and administrative requirements of the educational system?
- Is there adequate technical support to provide timely, expert trouble-shooting, technical assistance, on-going maintenance, operation, and upgrades?
- Are educational staff needs in educational technology being met? Is there a high level of satisfaction?
- Are the facilities within the system technology-ready? Do standards for facilities and infrastructure include technology requirements?

5. Accountability

- Have clear goals been set, accompanied by logical implementation and change strategies, measurable objectives and associated metrics including:
- Transient Rate
- Daily Attendance
- Dropout Rate

6. Student Achievement

- Is there a well designed data collection and analysis process that tracks progress, leading to data-driven decisions, that provides evidence as to whether or not the implementation is leading toward the goals?
- Is the data analysis appropriately informing decision making related to technology?
- Does the data collection and analysis process include:
- TerraNova Scores
- Evaluation of SB 482 Inadequate Schools that were funded with technology in the remediation process
- Evaluation of Title I funded technology programs
- Evaluation of Technology Literacy Challenge Fund Programs
- Other technology based efforts

VII. Coordination with State Academic Standards

The high, measurable standards in reading/language arts, mathematics, science, social studies, computer education, health, physical education are the cornerstone for strengthening Nevada's education system and for ensuring that all students in the state have access to a rigorous program of study.

Convinced that technology can play a powerful role in promoting student achievement, the Council to Establish Academic Standards and the Commission on Educational Technology work cooperatively to ensure that happens.

The standards for the core academic areas are the foundation for further and more specific recommendations on curriculum redesign, curriculum materials development, professional development and evaluation/assessment tools to integrate technology into teaching and learning.

VIII. Supporting Technology Integration

A. Develop and promote distance learning in Nevada

A variety of technologies are being used in support of existing courses including satellite, cable, ITFS, compressed video, video conferencing and the Internet. Some of these require significant investments by schools for participation. Forty years of research indicates that distance learners, regardless of the technology, learn as well as students in face-to-face classrooms. It appears that student motivation and instructional design are more critical for student achievement than the technology used to transmit instruction.

B. Public Libraries as Education Partners

In 1994 the Department of Education conducted a national survey in regards to the role of public libraries in relation to national education goals. The results of the survey showed most of those surveyed, especially ethnic minorities, regard public libraries as a very important source of support for their community's educational aspirations. Also the lower the education and income level of the public, the higher they rate the educational importance of their public library.

Two of the most important roles public libraries play are:

- Educational support center for students of all ages
- Discovery and learning center for preschool children

The primary finding of the survey was:

Libraries are fundamental to the American education experience libraries can be dynamic learning centers for everyone and contribute to helping the nations communities achieve national education goals.

SOURCE: *The Roles of the Public Library in Society-The results of a national Survey: Final Report*, by George D Elia, in collaboration with the University of Minnesota Center for Survey Research and the Gallup Organization (July 1993)

In 1994 the *Digital Divide, Information Literacy* and even the Internet as an educational tool were unknown factors in American education. In 2001 these issues are critical, and public libraries are increasing their role as an education partner in their communities.

Nevada has 23 city, county or district library systems. These systems have 82 physical locations open to the public at least 40 hours per week. Many of their resources are available via the Internet and provide library services beyond their physical walls and service hours to 24 hours a day — 7 days a week.

Public libraries in Nevada are committed to providing access to technology to support student learning. This support begins as early as emergent literacy programs such as preschool computer activities and continues through the student's school years to college preparation and beyond.

The critical component of the public libraries' role in information literacy is the wealth of resources available in Nevada libraries. Nevada public libraries all deliver information databases online via the Internet. Statewide database licensing that included schools and public libraries provide magazine, newspaper resources, curriculum materials and encyclopedias to every student in schools, every patron in public libraries and offers at home access beyond school and library hours. Nearly every public library offers their holdings to be searched via any computer connected to the Internet. In Nevada, over 5 million materials are available via each library's (OPAC) Online Public Access Catalog.

In addition to these databases, librarians statewide spend significant time researching and organizing free Internet sites recommended for their quality and their ability to support the curriculum in K-12.

An important aspect of the partnership of education and public libraries is the role libraries play in homeschooling. In most communities the only educational resource available to homeschoolers is the public library. Home schooled children may not have the same access to information as other children, and libraries are in a position to help them, particularly in technology resources.

The future of the public library partnership in meeting education goals depends on a concerted effort for the collaboration of resource allocation to provide adequate support for statewide licensing of high quality content. Critical to the success of an informed citizenry is high-quality content in an organized and accessible format that provides learning opportunities for students, teachers and library patrons wherever and whenever they need the information.

C. Ensure the needs of students with disabilities and those traditionally underserved are addressed.

In classrooms all over the country, students with physical, sensory, intellectual, and emotional disabilities are working on their own, researching homework assignment, solving math problems, drafting compositions, and keeping up with their classmates. Some are doing more than just getting along; they are excelling. Students are accomplishing these feats with the assistance learning tools and strategies that years ago could only be imagined.

Over the past ten years researchers and developers have designed an array of learning tools that identify students' needs, foster higher-order thinking skills, and create

independence inside and outside the classroom. Challenges once considered impossible to overcome are now surmountable for many students with disabilities, allowing them to become productive workers and active and independent learners. Many tools and strategies are can be used by students with a wide range of special needs.

Learning tools are the instructional devices, media, and materials that help students with physical, sensory, intellectual, and emotional disabilities gain knowledge, develop complex thinking skills, and become independent learners. Decisions on which tools to use and how to use them are shaped by instructional strategies designed for individual students along the basis of the student s needs, strengths and learning goals.

User-friendly learning tools and sound instructional strategies that are research-based are important investments in our children s education. These learning tools and instructional strategies can help teachers guide students along the most direct path to high achievement. If used and supported appropriately, technology as the potential to help students learn faster, better, and in some cases, at lower-than-expected costs. It has already been demonstrated in classrooms across the country that technology is capable of energizing the learning process, of easing burdensome reporting requirements, of improving precision in student assessment, and of increasing the effectiveness of teaching — adding up to higher achievement for all students.

In order to The Nevada Department of Education has funded the Nevada Special Education Technology Assistance Project since 1986 when it first became apparent that assistive technology could benefit special education students in Nevada. Federal mandates place considerable responsibility on schools to provide services in this area. The project has evolved over the years in response to recognized need, federal regulation, and the desire to provide quality services in the state.

The Nevada Special Education Technology Assistance Project has aided students with disabilities, their parents, and the professionals that serve them. The services provided by the project have made assistive technology, as prescribed by regulations and best practices in education, more accessible to those who may need them. Students with disabilities need to be included in all technology integration strategies. One of the key points in the Individuals with Disabilities Education Act (IDEA 97) is that technology needs to be taken into account in the development of an Individual Education Plan (IEP). The following key strategies for students with disabilities and will foster the technology components of IDEA 97.

- To disseminate information about assistive technology in general, and about the project specifically
- To provide technical assistance with assistive technology products.
- To facilitate assistive technology assessments.
- To provide technical assistance in individual education plan (IEP) and curriculum development

D. Ensure the needs of the Nevada Youth Training Center and the Caliente Youth Center are addressed.

Nevada has two state operated Youth Training Center facilities that are detention centers for youths who have been institutionalized by the State of Nevada District Courts for correctional care. Students are typically in a center for a period of nine to twelve months as per direction of the Court. Each student, as required by the Nevada Department of Education, is administered the Test of Adult Basic Education (TABE), as their entrance and exit exam.

The Nevada Youth Training Center (NYTC) is located on the east of Elko and is a staff secure, residential correctional facility for male juvenile offenders. Youths between the ages of twelve and eighteen are committed to NYTC by the State of Nevada District Courts for correctional care.

NYTC includes Independence High School. Independence High School is a fully accredited, year-round school that is not part of any school district. It is funded directly by the Nevada State Legislature. This is a year-round high school where students transfer in and out on a continuous basis, year around. The transient nature of the student body can be appreciated in light of the fact that over 600 individual boys are served at the facility each year, while less than 200 are students at any one time. Because of this, and because student academic achievement varies greatly, the curriculum is, by necessity, highly individualized in nature.

Caliente Youth Center (CYC) is nestled in the mouth of Clover Creek canyon in the heart of Lincoln County. Since its establishment in 1962, CYC has provided institutional services for court-ordered female juvenile offenders between the ages of twelve and eighteen. During the 1988-89 fiscal year, CYC was opened to males of the same age who are transferred from NYTC. Today, CYC remains co-educational with three cottages of female offenders and four of male. At inception, the institution was designed for 140 students. The average daily population is 155.

CYC contracts with Lincoln County School District for educational services. C.O. Bastian High School provides comprehensive educational and vocational services for students in grades 6-12. Many of these students are identified as requiring special education services, and students at the high school level are typically credit deficient. The philosophy of C.O. Bastian High School is to provide educational opportunities to enable each student to improve.

Both NYTC and CYC are entire institutions/schools of at-risk students. Typically, the schools do not have these students for an extended period of time for instruction. This transience creates an environment with unique challenges for the educational staff. Each student requires an individualized learning program to accommodate different learning

styles and capabilities. Additionally, many of the students lack motivation and have low self-esteem.

Both NYTC and CYC have developed extensive technology plans that reflect their unique instructional and funding challenges. This statewide plan goals and levels of integration also supports the needs facing the Nevada Youth Training Center and Caliente Youth Center.

E. Implement a K-12 educational telecommunications plan

Telecommunications services to support Internet connectivity for Nevada schools have been provided largely through two mechanisms funded by the Nevada Legislature. NevadaNet, the physical infrastructure connecting sites to the UCCSN backbone, received funding through SB204 (1995) and AB606 (1997) to provide a limited degree of services to K-12. The Nevada School Network (NSN), operated by the Nevada Department of Education, received some funding in the 1995 biennium to provide Internet services, such as e-mail and Internet access accounts for teachers and students. Since 1997 the NSN Help Desk has been funded by Nevada Department of Education. In addition to these efforts specifically funded by the Nevada legislature, some districts have allocated their own resources to fund connectivity.

All of these efforts have been extremely successful in connecting teachers and schools to the Internet considering the limited resources available to support them. They are excellent model programs for developing services and resources, and determining the needs of elementary and secondary schools to connect to the Internet. These are vital services that educators currently depend on, and they need continued support.

The successful implementation of this educational technology plan heavily depends on the extension of dedicated Internet access to every classroom in Nevada, with bandwidth sufficient to provide access to appropriate resources that meet the requirements for Level 3 technology integration defined by the Commission. The purpose of this set of recommendations is to chart a course for how Nevada might further develop and build a statewide telecommunications infrastructure that has the capacity to support all K-12 schools and classrooms in Nevada.

The following approach to K-12 telecommunications is based on the assignment of differentiated roles and responsibilities for each party involved in designing, providing, using, and improving telecommunications services to K-12. This approach is based on the Commission setting overall direction for K-12 telecommunications; establishing a Telecommunications Coordinating Group to define needs and acceptable service standards for a K-12 network service provider; and individual school districts implementing within-district LANs to connect to the network service provider. These duties assume that each

entity works collaboratively with the other bodies and that as new issues arise, they are assigned to the appropriate body by the Commission on Educational Technology.

Role of the Commission on Educational Technology in K-12 Telecommunications

The Commission is the appropriate body to provide leadership for K-12 telecommunications. That includes providing the vision, goals, and policy directions to guide telecommunications development and use. As the state of Nevada's policy-making body for educational technology in the K-12 system, the Commission would:

- Specify elements to be included in a detailed telecommunications plan (e.g., staffing, equipment, services);
- Seek appropriate legislative resources to fund the plan;
- Oversee the development of a process for selecting a K-12 network service provider and holding that provider accountable for providing high quality services;
- Seek expert telecommunications advice from a qualified, neutral consultant;
- Establish and appoint members to a Telecommunications Coordinating Group (see next) and review and approve its membership on an annual basis; and
- Provide accountability to the Legislature for the use of state funds and the provision of network services that support the goals of this plan.

Telecommunications Coordinating Group (TCG)

The TCG would be composed of representatives from the following organizations, at a minimum, and serve one-year terms, with review and approval by the Commission:

- Commission on Educational Technology, chair;
- Department of Education Staff;
- K-12 Schools:
 - Clark County School District,
 - Washoe County School District,
 - Northeast Nevada Technology Consortium, (from the Technology Support Committee)
 - One other rural district;
- The University and Community College System of Nevada, Office of Information Technology;
- The Consumer Protection Division of the Attorney General's Office;
- Public Broadcasting System stations (KNPB and KLVX); and
- The K-12 network service provider, if different than one of the above entities.

The TCG would provide support to both the Commission and all K-12 school districts. While it includes representatives from at a minimum of five school districts, it would coordinate closely with all school districts in the pursuit of the following responsibilities:

- Develop a detailed telecommunications plan as per guidelines established by the Commission;
- Identify and recommend service levels needed by K-12 school districts that will be incorporated into a service contract prepared by the Commission;

- Recommend to the Commission the timelines, deliverables, and performance levels to be included in a service contract;
- Support current school access at existing levels for the Internet through provided by UCCSN, evaluate alternative services, and include appropriate solutions in the telecommunications plan;
- Advise districts on emerging issues;
- Advise the Commission on telecommunications issues;
- Define interface standards;
- Develop or provide advice to districts on policies (e.g., acceptable use and Internet filtering);
- Monitor implementation of services and service contract;
- Identify problems with service and coordinate with the network service provider to develop solutions;
- Provide information the Commission on performance of the network service provider;
- Identify and prepare e-rate related materials that may be needed for support of a K-12 network; and
- Review and evaluate services provided for home dial-up access to the Internet.

Role of Individual School Districts

School districts have responsibility for issues that must be carried out within the district. This includes, but is not limited to:

- Implement policies and meet the goals set by the Commission;
- Develop appropriate policies internal to the district;
- Integrate telecommunications into the district technology plan;
- Monitor and communicate changes in needed service levels;
- Design and administer the in-district LAN/WAN;
- Seeking expert advice in the development and operation of the in-district LAN/WAN;
- Ensure compliance with interface standards;
- Identify problems and communicate these to the TCG; and
- Identify areas where assistance from other school districts would be helpful.

These recommendations, if implemented, will provide a strong backbone of services and infrastructure that will enable the most effective use of networked educational resources possible for Nevada's schools and students. By establishing these on-going working relationships, the state of Nevada can be assured that all of Nevada's schools have equitable access to telecommunications resources, and that an environment of collaboration and mutual support between K-12 and higher education is enhanced.

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Appendices

- A. Nevada State Technology Integration Status
- B. Cost of Implementation/Technology Budget
- C. Distance Learning in Nevada
- D. Nevada Statewide Technical and Wiring Standards

A. Nevada Technology Integration Status

Summary of Internet Connectivity

| | # of Schools | Schools with Internet | % Schools Connected | # of Classrooms | Classrooms with Internet | %Classrooms Connected | % of Schools with High Speed Connections |
|-------------------|-----------------|--------------------------|------------------------|--------------------|-----------------------------|--------------------------|--|
| Carson | 10 | 10 | 100% | 450 | 450 | 100% | 0% |
| Churchill | 8 | 8 | 100% | 260 | 260 | 100% | 100% |
| Clark | 244 | 243 | 100% | 12,500 | 8,445 | 68% | 100% |
| Douglas | 13 | 12 | 92% | 349 | 349 | 100% | 23% |
| Elko | 26 | 26 | 100% | 606 | 392 | 65% | 100% |
| Esmeralda | 3 | 1 | 33% | 9 | 3 | 33% | 0% |
| Eureka | 3 | 3 | 100% | 45 | 44 | 98% | 100% |
| Humboldt | 13 | 13 | 100% | 275 | 275 | 100% | 54% |
| Lander | 7 | 7 | 100% | 102 | 102 | 100% | 71% |
| Lincoln | 9 | 9 | 100% | 80 | 80 | 100% | 100% |
| Lyon | 14 | 14 | 100% | 492 | 492 | 100% | 100% |
| Mineral | 5 | 4 | 80% | 73 | 72 | 99% | 0% |
| Nye | 17 | 17 | 100% | 310 | 295 | 95% | 99% |
| Pershing | 4 | 3 | 75% | 81 | 77 | 95% | 100% |
| Storey | 4 | 4 | 100% | 40 | 40 | 100% | 0% |
| Washoe | 84 | 84 | 100% | 2,066 | 2,066 | 100% | 0% |
| White Pine | 9 | 9 | 100% | 109 | 109 | 100% | 100% |
| TOTALS | 473 | 467 | 99% | 17,847 | 13,551 | 76% | 80% |

Reasons for no connectivity or no high speed access:

Lack of funding

Unavailable service at school location

Lack of bandwidth available through NevadaNet backbone

**Summary of Educational Technology Funding
SB555 — Fiscal Years 2000 & 2001**

| | 24.1(a) FY00 | 24.1(a) FY01 | 24.1(c) FY00 | 24.1(c) FY01 | Totals |
|-------------------|---------------------|---------------------|---------------------|---------------------|------------------|
| Carson | 66,444 | 66,444 | 16,881 | 16,881 | 166,650 |
| Churchill | - | - | 16,517 | 16,517 | 33,035 |
| Clark | 570,800 | 573,654 | 258,125 | 258,125 | 1,660,704 |
| Douglas | 7,848 | - | 17,823 | 17,823 | 43,496 |
| Elko | 359,724 | 437,574 | 29,103 | 29,103 | 855,506 |
| Esmeralda | 3,000 | 3,000 | 2,559 | 2,559 | 11,118 |
| Eureka | 13,560 | 13,560 | 2,000 | 2,000 | 31,120 |
| Humboldt | 74,663 | 70,419 | 11,862 | 11,862 | 168,808 |
| Lander | - | - | 6,563 | 6,563 | 13,126 |
| Lincoln | 24,408 | - | 7,968 | 7,968 | 40,345 |
| Lyon | 6,780 | 6,780 | 24,868 | 24,868 | 63,297 |
| Mineral | 103,880 | 172,970 | 5,839 | 5,839 | 288,531 |
| Nye | 26,058 | 51,528 | 19,164 | 19,164 | 115,915 |
| Pershing | 38,764 | - | 5,690 | 5,690 | 50,145 |
| Storey | 4,068 | 4,068 | 3,708 | 3,708 | 15,552 |
| Washoe | - | - | 62,517 | 62,517 | 125,035 |
| White Pine | - | - | 8,805 | 8,805 | 17,610 |
| Totals | 1,300,000 | 1,400,000 | 500,000 | 500,000 | 3,700,000 |

**Summary of Educational Technology Funding
SB482 — Fiscal Years 1998 &1999**

| | 61.1 | 61.1 Supp | 61.2-FY98 | 61.2-FY99 | 61.2 SA | Totals |
|-------------------|-------------------|------------------|------------------|------------------|------------------|-------------------|
| Carson | 962,275 | | 90,394 | 120,526 | 76,274 | 1,249,469 |
| Churchill | 524,008 | | 56,731 | 75,641 | 33,073 | 689,453 |
| Clark | 15,231,600 | | 1,805,423 | 2,407,229 | 986,869 | 20,431,121 |
| Douglas | 664,978 | | 77,469 | 103,292 | 64,565 | 910,304 |
| Elko | 1,601,493 | | 122,245 | 162,993 | | 1,886,731 |
| NYTC | 74,950 | | 10,000 | | | 84,950 |
| Esmeralda | 59,859 | | 7,500 | 10,000 | | 77,359 |
| Eureka | 69,925 | | 7,500 | 10,000 | 105,272 | 192,697 |
| Humboldt | 527,400 | | 46,887 | 62,516 | 2,650 | 639,453 |
| Lander | 215,300 | | 20,448 | 27,264 | 62,575 | 325,587 |
| Lincoln | 186,000 | 35,392 | 19,200 | 25,600 | 56,420 | 322,612 |
| Caliente | 80,500 | | 10,000 | | | 90,500 |
| Lyon | 861,000 | | 76,100 | 101,467 | | 1,038,567 |
| Mineral | 122,200 | | 14,034 | 18,712 | 1,088 | 156,034 |
| Nye | 717,600 | | 65,176 | 86,902 | 37,500 | 907,178 |
| Pershing | 66,500 | | 12,769 | 17,025 | | 96,294 |
| Storey | 193,420 | | 7,500 | 10,000 | 88,950 | 299,870 |
| Washoe | 4,426,200 | | 485,294 | 647,059 | 2,941 | 5,561,494 |
| White Pine | 494,400 | | 25,331 | 33,774 | 201,822 | 755,327 |
| Libraries | 385,000 | | | | | 385,000 |
| Totals | 27,464,608 | 35,392 | 2,960,001 | 3,920,000 | 1,719,999 | 36,100,000 |

B. Cost of Implementation/Technology Budget

April 26, 2000

Governor Kenny Guinn
Governor's Office
Carson City, NV

Re: Commission on Educational Technology Proposed Budget for Fiscal Years 2002 and
2003

Dear Governor Guinn:

The Commission on Educational Technology's proposed budget represents the yearly and biennial needs of all the school districts. The dollar amounts represent continued implementation of the approved State Plan to Implement Technology to Support Student Learning and the maintenance and replacement of hardware and software.

Professional development is the primary funding priority of the Commission on Educational Technology for the 2001-2003 biennium. Previous funding (SB482 & SB555) equipped the schools with computers and infrastructure. The teachers now need the knowledge, tools, and resources necessary to integrate technology into their classroom instruction

The "**Technology Training for Teachers - Inoculation Project**" would provide one-shot funding, which would place one Site Technology Trainer in most schools in Nevada for a limited time of two years. The idea is to *inoculate* the workforce with the training necessary to integrate technology into the classroom. Trainers must be available during regular school hours to provide training for teachers in their classrooms. The project will also provide seven Regional Technology Coordinators to the existing Regional Professional Development Programs to implement a Train-the-Trainer model of professional development. The Train-the-Trainer model uses Master Teachers to instruct Trainers. This ensures the effectiveness of the Trainers in the classrooms.

The Trainers must focus on the teachers' lessons and not spend time fixing computers. However, timely technical support must be provided to maintain the inventory of equipment in Nevada schools. Teachers become quickly frustrated when technology in their classrooms fail. It is critical that technicians, as well as Trainers, receive funding.

The Telecommunications Advisory Committee Report to the Commission estimates the dollar amounts in the budget for new equipment, maintenance, and replacement equipment. Exponential growth of connectivity in the schools is stressing the capacity of the current infrastructure to its limits. Increased use of the Internet and video conferencing in the classroom is quickly using up the bandwidth available on NevadaNet, Nevada's educational backbone.

Teachers need to have access to high quality content material and resources for educational technology. The Commission has made it a priority to continue funding statewide licenses for two online library databases. These licenses were funded from SB555 and have received rave reviews from teachers and librarians. The schools also need additional funding for curricular software unique to their school. Other educational resources are widely available to teachers throughout the country. The teachers just need help finding it all, which they do not have time to do during the school day. An educational technology resource position is needed at the Department of Education.

The Commission has included an evaluation component to gauge the effectiveness of educational technology in the classroom.

On behalf of the Commission, I would like to thank you for considering our proposed budget request.

Sincerely,

Moises Denis
Chairman

MD/msk

Enclosures (1)

State Technology Plan

Legislative Funding Proposal

Summary

| | | Yearly | Biennium |
|--------------------------|--|---------------------|---------------------|
| One-shot Funding | | | |
| Professional Development | | \$11,939,389 | \$23,878,778 |
| Infrastructure | | \$4,213,000 | \$4,708,000 |
| Evaluation Component | | \$543,485 | \$1,086,970.08 |
| Subtotal | | \$16,695,874 | \$29,673,748 |

| | | | |
|--------------------------|--|--------------|---------------------|
| Recurring Funding | | | |
| Timely Technical Support | | \$14,929,000 | \$29,858,000 |
| Infrastructure | | \$24,352,908 | \$40,279,816 |
| High-Quality Content | | \$4,442,722 | \$8,885,444 |
| Subtotal | | | \$79,023,260 |

| | | | |
|---------------------|--|---------------------|----------------------|
| Grand Totals | | \$77,116,378 | \$108,697,008 |
|---------------------|--|---------------------|----------------------|

Professional Development

Technology Training for Teachers - Inoculation Project

The professional development costs listed are one-shot funding.

Italicized amounts in budget are one-shot funding.

One-shot funding is summarized at the end of this proposal.

| | Quantity | Yearly | Biennium |
|---|----------|---------------------|---------------------|
| Site Technology Trainers | 207 | <i>\$10,350,000</i> | <i>\$20,700,000</i> |
| Regional Training Coordinators | 5 | <i>\$375,000</i> | <i>\$750,000</i> |
| Regional Professional Development Program Train-the-Trainer Costs | | <i>\$1,214,389</i> | <i>\$2,428,778</i> |
| Total | | \$11,939,389 | \$23,878,778 |

Trainer costs were calculated based on 207 Trainers multiplied by \$50,000 for salaries and benefits.

The number of Trainers needed was determined by a needs assessment sent to all districts. The general rule was to allow 1 Trainer for every 50 teachers. Some schools have 1 Trainer per school and others share a Trainer. The total number of Trainers required is 347. There are 471 schools in Nevada. Clark County currently employs 140 Educational Computing Specialists (ECS). These ECS's perform similar activities as the Trainer and were subtracted from the total of Trainers needed.

Coordinator costs were calculated based on 5 Coordinators multiplied by \$75,000 for salaries and benefits. The higher salary is based on a higher level of educational technology expertise, increased responsibility, and supervisory activities.

The number of Coordinators was based on 1 Coordinator for every 56 trainers. The total number of Coordinators required is 7 This includes:

Northeastern region = 1
Northwestern region = 1
Western region = 1
Southern region = 4

These regions are divided based on the current Regional Professional Development Programs. The southern region, predominately Clark County, currently employs 2 Coordinators. They were subtracted from the total of Coordinators needed.

The costs associated with the regional centers are based on the same costs used in the creation of the Regional Professional Development Programs and the cost of Train-the-Trainer workshops. The costs include the following:

| | Quantity | Salary/Costs | Total |
|---|----------|--------------|-----------|
| 1 Clerk for each Coordinator | 5 | \$33,651 | \$168,255 |
| Travel to workshops based on mileage and per diem for Trainers attending regional Train-the-Trainer workshops | | | \$74,379 |
| Trainers attending Summer Institutes receive a stipend for 40 hours of Train-the-Trainer activities. | 347 | \$1,000 | \$347,000 |
| Equipment for regional training programs | | | \$373,975 |
| Materials | | | \$250,000 |
| Phones | | | \$780 |

Timely Technical Support

| | Quantity | Yearly | Biennium |
|--------------------------|----------|---------------------|---------------------|
| Technicians | 290 | \$14,500,000 | \$29,000,000 |
| Training for Technicians | 329 | \$329,000 | \$658,000 |
| Help Desk | 2 | \$100,000 | \$200,000 |
| Total | | \$14,929,000 | \$29,858,000 |

Tehnician costs are calculated based on 324 Technicians multiplied by \$50,000 for salaries and benefits.

The number of Technicians needed is determined by a needs assessment sent to all districts. The general rule is to allow 1 Technician for every 50 teachers. Some schools have 1 Technician per school and others share a Technician. The total number of Technicians required is 329. There are 471 schools in Nevada. Nevada currently employs 39 Technicians.

Training for Technicians is based on the total number of Trainers, 329 multiplied by \$1,000 per year for workshops, seminars, or other training.

Based on the relatively low salary and the possible lack of qualified technicians in Nevada, entry-level technicians will be hired and trained.

Help Desk costs are based on calculations provided by UCCSN, who currently runs a help desk similar to the one recommended in this plan. Salaries for 2 staff are \$50,000 per year, the same as entry-level technicians.

Infrastructure

| | | Yearly | Biennium |
|--|--|--------------|--------------|
| Nevada Distance Learning Satellite Service, KLVX | | \$495,000 | \$990,000 |
| Projection Equipment for Classrooms | | \$2,826,000 | \$2,826,000 |
| Nevada School Network | | \$100,000 | \$200,000 |
| Networks & Connections for Districts | | \$3,668,020 | \$7,336,040 |
| Mini-Hubs along I-80 | | \$892,000 | \$892,000 |
| Hardware maintenance & replacement | | \$16,371,888 | \$32,743,776 |
| | | | |

| | | | |
|---------------|--|---------------------|---------------------|
| Totals | | \$24,352,908 | \$44,987,816 |
|---------------|--|---------------------|---------------------|

Nevada Distance Learning Satellite Service costs are provided by KLVX, based on current installations and statewide need. These costs include:

| | Yearly | Biennium |
|------------------------------------|---------------|-----------------|
| High-Quality Content | \$190,000.00 | \$380,000 |
| Professional Development | \$50,000.00 | \$100,000 |
| Additional/Upgraded Downlink Sites | \$195,000.00 | \$390,000 |
| Help Desk/Maintenance | \$60,000.00 | \$120,000 |

Projection Equipment for Classrooms costs are based on \$300 multiplied by 471 schools and 20 classrooms per school.

Nevada School Network costs are based on the amount of network administration that UCCSN provides the school districts. This data is provided by UCCSN. This is based on a yearly salary and benefits of \$62,500 and hardware costs of \$75,000.

Networks & Connections for Districts costs are based on a needs assessment conducted with school districts. The detailed information is contained the the Telecommunications Advisory Committee's report to the Commission, dated April 3, 2000

Mini-Hubs along I-80 costs are based on the Points-of-Presence along Interstate 80. These POPs are the entry points where district connections are made with the fiber-optic cable laid along the highway for the Williams Project. This data is provided by UCCSN.

High-Quality Content

| | Quantity | Yearly | Biennium |
|--|-----------------|--------------------|--------------------|
| NDE Ed Tech Resource Staff | 1 | \$75,000 | \$150,000 |
| Online Library Databases | 2 | \$250,000 | \$500,000 |
| Curriculum Resources \$1000 per school per year | 471 | \$471,000 | \$942,000 |
| Software maintenance & replacement | | \$3,646,722 | \$7,293,444 |
| Total | | \$4,442,722 | \$8,885,444 |

NDE Ed Tech Resource Staff costs are based on the yearly salary of an additional educational technology person at the Department of Education.

This person would provide educational technology resources to all of the districts. This would include: a central educational technology web site for the state, statewide pricing on software and hardware, online teacher assessment, and training opportunities for teachers.

Online Library Databases costs are based on the yearly subscriptions rates of the currently approved EBSCO and SIRS Mandrin databases.

Curriculum Resource costs are based on \$1,000 per school for individualized software for site-based programs.

C. Distance Learning in Nevada

Distance Learning in Nevada

Definition of Distance Learning and Implications: Distance Learning is broadly defined and includes any activity that supports student learning and is delivered by any source outside of the classroom particularly via one or more technologies. Just as there is a shift in terminology in the early 1990 s from distance education to distance learning to reflect the emphasis on the learner rather than the institution, the distributed learning is gaining favor, since distance is not the critical element.

Understanding the goals and targeted audiences for a distance learning program is critical, since these factors impact network and instructional design. Distance learning is discussed in several terms:

- Improved classroom instruction
- Extended School Day
- Increased College Enrollment
- Parent Involvement
- Lifelong Learning
- Staff Development
- Literacy
- ESL/ELL

The following pages list the activities that the Public Television Stations: KLVX Channel 10, Las Vegas & KNPB Channel 5, Reno and the University and Community College System of Nevada and the Virtual Schools: Cyber SchoolHouse & Nevada Virtual High School are performing to support distance learning.

KL VX/Channel 10

Educational Media Center (EMC) is a full service educational lending library available to teachers. The center offers thousands of videos, CD-ROMs, DVDs, and other instructional media that can be obtained for classroom use. The EMC Catalog lists the entire collection. Checkouts can be performed online (media.klvx.org), in-person, or by 24-hour touch-tone telephone 702-799-5009 allowing teachers flexibility and convenience. The center has duplicated over 120,000 videos and CD-ROMs in the last 4 years. In addition to the over 8,000 titles available for check out an additional 7,00 titles are distributed to teachers through broadcast operations.

Nevada Distance Learning Satellite Services Digital Satellite downlink dishes located in rural schools throughout the state pick up multiple channels of instructional programming beamed daily via satellite, making accessible student programming and staff development opportunities previously unavailable.

Electronic Field Trips/ Sat-Chats are live, electronic dialogues connecting K-12 students with unique people and places, focusing on science, technology and other subject areas. KL VX broadcasts the international electronic field trips such as Journeys to Wilderness Canyons, along with other field trips from other states and sources such as Hawaii and NASA. KL VX funded through public and private sources produces and broadcasts their own Nevada-based, Nevada exclusive Sat-Chats. Trips include CAT-Chat with MGM Grand lion trainer Keith Evans; JET-Chat featuring the renowned Thunderbirds, the United States Air Force Air Demonstration Squadron; Desert-Chat featuring international explorer Jamie Clark and SEA-Chat with the Dolphin Habitat at the Mirage Director, Julie Wignall. Students call-in, fax e-mail or appear live through compressed video their questions to Sat-Chat guest, and a digital photo taken of each classroom is shown onscreen whenever a site connects on-air. KL VX s Instructional Television network, which consists of 12 channels of microwave links to Clark County School District schools and satellite links to rural schools statewide, makes connecting a significant percentage of Nevada students possible.

Ready to Learn airs educational, nonviolent children s programming and interstitials from 7:30am until 5:30pm on the Channel 10 weekday broadcast schedule. Additional RTL shows are aired on EDU TV, cable channel 70, seven days a week. Ready to Learn helps children ages 2-12 gain the skills, especially literacy, which they need to be successful in school and life. KL VX RTL focuses approximately 90% of its outreach efforts on Clark County School District Title 1 schools. The project employs five tools in executing its mission:

- PBS television broadcast of quality kids shows and interstitials. Interstitials are fun learning messages aired between children s programs instead of commercials.
- Companion Web sites extending the broadcasts instructional messages

- RTL training workshops demonstrating how caregivers can use home media to help children learn outside the formal context of the school day
- Distribution of free books, in English and Spanish, from KLVX to disadvantaged children throughout Southern Nevada. More than 30,000 books have been distributed to children each year.
- Coordination of a Community Advisory Board, which brings together diverse community members who, strive to improve children s school readiness.

Special Technology Projects KLVX Ready to Learn project earns an A+ for its innovative use of learning technologies including the ActiMates and Books-on-Tape initiatives.

The ActiMate project was conceived by KLVX staff and is the nation s first of its kind to employ the special interactive characters in the formal classroom setting. Microsoft ActiMates take the form of plush Arthur, D.W. and Barney characters and interact with young children by singing, counting and playing problem-solving games. Bulk ActiMate purchases and teacher training sessions have been executed district-wide thanks to Title 1 and Technology Literacy Challenge Fund grants, and KLVX Ready to Learn staff have been performing special student workshops to help reinforce each ActiMate-delivered skill. Several Barneys as well Arthur and D.W. ActiMates are available for long-term checkout to Clark County School District teachers.

A joint project among Junior League of Las Vegas, the KLVX Ready to Learn Project and the Clark County School-Community Partnership Program, the 2000 kits comprised of new books-on-tape and their companion storybooks have been created for distribution to classrooms and libraries in at-risk schools throughout Clark County. More than half the books for the project were donated by Ready to Learn. RTL was also responsible for training volunteers from organizations including Caesar s Palace, The Reynolds Foundation, AAA, AllState, UNLV School of Law and others to perform the readings. The project was the brainchild of the Partnership Program which is distributing the finished kits to area schools with the greatest need.

ENTICE -Education in Nevada: Technology Infusion for Curriculum Enhancement-is a multifaceted training project created to help Nevada educators effectively use computers in their classrooms. Developed jointly by the State of Nevada, KLVX, Clark County School District and Apple Computers, ENTICE provides a variety of products to assist with technology integration in the classroom. Introduction videotapes teach basic computer operation; Integration videotapes showcase exemplary Nevada teachers demonstrating how they use the computer for improving student instruction; and a UNLV teacher-education video course, Computer Uses in Education, features step-by-step directions for using common classroom programs such as ClarisWorks and Internet browsers. Supporting print materials, including a hands-on Workshop-in-a-Box, accompany the video programming. Nevada teachers can access ENTICE via satellite, school ITV systems and VHS tape collections. Interactions produced a series of live, interactive professional development sessions demonstrating classroom best practices of

technology and allowed teachers to pose questions and receive additional information where needed.

Twelve channels of ITV programming addresses all grade levels and subject areas, broadcast daily to the schools. The Navigator teacher resource program guides provides teachers programming and curricular resources. Over 12,000 copies of the Navigator have been distributed via print, cd-rom or web site in both the elementary and secondary version.

Broadcast Channel 10 airs Ready to Learn programming (such as Wishbone) each weekday, to provide families a tool at home for extending the learning the teacher conveys during the school day. Channel 10 also airs for-credit distance learning courses for CCSD and CCSN each morning. High school distance education classes available via KLVX have had a profound impact in Clark County. Last year alone, over 1,200 (primarily) credit deficient students participated, providing a significant aid in reducing at-risk student populations.

School Dubbing Service The ITV office provides a school dub service for librarians, administrators and teachers who want copies of the programs currently aired on the ITV channels.

Professional Development — KLVX acquires, produces and distributes hundreds of professional development titles to assist in ongoing training needs of teachers and staff. KLVX produced programs are as diverse as dealing with blood borne pathogens to informing staff on state regulations maintaining proper teacher student relations.

Staff Development Workshops The ITV staff is available to conduct workshops at the school site to educate the staff on curriculum correlation and other aspects of ITV. This includes using educational technology in the classroom, the ITV teacher resource guide (The Navigator), utilizing video equipment, and using the teacher guides which accompany a majority of the programs. Ready to Learn workshops can also be conducted for family and community events

KLVX Website provides an update on current programming and events. It also offers teacher lesson plans, ITV utilization tips, online media reservations and links to related site. www.klvx.org

ITV School Representatives serve as the in-house liaisons at each school site for staying connected with the latest ITV happenings such as electronic field trips.

For further information regarding KLVX Channel 10
educational programming, resources and events contact:

Lee Solonche
Director: Distance Learning
4210 Channel 10 Drive
Las Vegas, NV 89119
(702) 799-1010
lsolonche@klvx.org

KNPB/Channel 5

NTTI The National Teacher Training Institute is presented each year by KNPB. The NTTI model features local master teachers, who create standards-based lessons using technology resources, then model their teaching at the institute. More than 200 teachers and school administrators from Northern Nevada attend the NTTI events, held in Elko and in Reno. KNPB first partnered with the Northeast Nevada Technology Education Consortium and the Northeast Regional Professional Development Project to present NTTI in Elko in 2001. Collections of lessons correlated to the Nevada Standards in Math, Science, Language Arts, Social Studies and Technology have been generated from these Institutes. These lessons are available online at www.knpb.org.

Mathline/Scienceline are year-long professional development programs for teachers of mathematics K-12 and elementary science. The resources include sets of videos demonstrating best practices, a print study guide, an online discussion group moderated by a local master teacher, face-to-face meetings, and access to the national PBS Mathline & Scienceline websites and conferences. Mathline lessons are designed to implement the standards of the National Council of Teachers of Mathematics. Scienceline explores the steps in inquiry science teaching strategies, as endorsed by the National Science Teachers Association.

Literacy Link is a resource for adult learners. Five adult learning centers in northern Nevada participate in evaluation of electronic-based resources for GED preparation and workplace essential skills training. The first product Workplace Essential Skills is a video/print/online resource for adults who are re-entering the workplace. RHYME to Prime, a new project in partnership with the Children's Cabinet, provides Workplace Essential Skills training for homeless teens and out-of-school youth.

Educators Kits: *Nevada Experience*, *Art Beat*. The educator kits include time-coded video collection of episodes of *The Nevada Experience* and *Art Beat*. The accompanying print guide provides lessons and activities. *The Nevada Experience* collection is episodes that best correlate to the Nevada Standards for Social Studies. The *Art Beat* correlates to Nevada fine arts curriculum and includes a matrix demonstrating the use of the series across the core curriculum areas.

PT3 Grant Preparing Tomorrow's Teachers to Use Technology is a federally funded grant opportunity. KNPB is in partnership with University of Nevada Reno in Project Learning Links. The objective is to ensure that the university's College of Education students will be ready and willing to effectively infuse learning technology into the classroom curriculum. The objective will be met through university faculty professional development, technology-rich learning communities, and mentoring or coaching in the application of technology for pre-service teachers in their K-12 field.

Educational Resource Calendar Published monthly from August through June, KNPB distributes the Educational Resource Calendar to more than 5,500 teachers in Douglas, Carson, Churchill, Lyon, Mineral, Pershing, Storey and Washoe Counties. The calendar highlights and categorizes the educational programming and support services provided by KNPB.

Ready to Learn provides programming and services for young children, their parents and caregivers. KNPB annually broadcasts nearly 4,500 hours of the highest quality of children's television programs available, and presents more than 50 workshops for parents and other caregivers to teach how to extend the TV learning into reading and other activities. Through the FirstBooks project, the station distributes more than 6,000 free books to children who are at-risk and more than 25,000 free copies of *PBS Families* and *PBS Families* magazines with the help of public libraries, the Nevada Hispanic Services, and other community organizations. KNPB collaborates with 20 community organizations to reach learners throughout Nevada and launched *Ready Teddy Times*, a Channel 5 newsletter for Ready to Learn children and families.

KNPB Website The website offers information about programming and events, and provides numerous resources for educators. www.knpb.org

Going the Distance KNPB in partnership with Truckee Meadows Community College (TMCC) has launched an external degree program in General Studies. Using telecourses, students are able to earn credits by studying independently at home.

For further information regarding KNPB Channel 5
educational programming, resources and events contact:

Patricia Miller
Vice President: Programming, Promotion, Education
1670 North Virginia Street
Reno, NV 89503
(775) 784-4555
patm@knpb.org

UCCSN

Infrastructure UCCSN supports and maintains NevadaNet, a statewide network providing interactive video and Internet access to many K-12 schools. Of the over 100 interactive video classrooms statewide, 23 are in K-12 schools; both Lyon and Elko School Districts either have or will have interactive video in all high schools in the district. They have digitized UNR/KNPB satellite uplink. UCCSN has adopted, systemwide, the WebCT courseware to assist in the development of web-based courses.

College courses for high school students Six campuses offer approximately 130 college courses to high school students. The majority of the college courses are taught by community college and university faculty and delivered over the web, ITFS, CV and in some cases cable TV or videotape.

Web-Based Services In 2000, the UCCSN created a web-based distance education catalog at www.scsr.nevada.edu/disted that includes all of the distance education courses offered by UCCSN institutions. The site allows students to hotlink to campus registration sites as well as have their most frequently asked questions answered. The FAQs site helps distant students apply to college, register for courses, learn about financial aid, and evaluate whether distance learning is for them.

Technology training for teachers: UNR and UNLV offer a wide range of graduate level staff development courses and special technology training classes and workshops for teachers and administrators. In coordination with KLVX, UNLV has developed four education classes that include: Teaching ESL, Teachers as Family Literacy Leaders, Literacy Instruction in Diverse Classrooms and Student Assessment in Language Arts, all combining video and Internet activities. UNLV offers a certificate program in educational technology for teachers an on-line course entitled *Integrating the Internet into the Classroom* . DRI sponsors N*STEP, and Summer Fellowships that bring together science teachers and research scientists. UNR and UNLV both received Preparing Tomorrow s Teachers to Use Technology Grants, focusing on helping the pre-service teachers to incorporate educational technology. All four community colleges now offer the 1st 2 years of teacher preparation programs, including courses in educational technology.

Growth from Fall 1997 to Spring 2000

5 new associate degree programs in allied health sciences,

110% growth in totally web-based courses,

100% growth in total distance education courses,

130% growth in distance education enrollments:

65% growth in the enrollment of high school students,

25% growth in the enrollment of K-12 teachers,

150% growth in enrollment of college students

For further information regarding UCCSN
programs, resources and events contact:

Katrina Meyer
Director of Distance Learning and Technology
2601 Enterprise Road
Reno, NV 89512
(775) 784-4901
kmeyer@nevada.edu

Virtual Schools

Cyber Schoolhouse The Clark County Cyber Schoolhouse (CCCS) officially began in 2000 for the purpose of creating high school curriculum online. To ensure high quality instruction, all courses are developed using the Nevada State Standards as a basis. The motto for the Cyber Schoolhouse is *Excellence in Education through Cutting Edge Technology*. This school is based on secondary curriculum that is designed to meet the highest academic standards possible. The program will continue to evolve and include staff development and training modules for all curricular areas. The resources include the Internet, CD-ROMs, online synchronous presentations, live broadcasts, and the use of videoconferencing and email. Respective CCCS instructors, all of whom are state certified, guide students through their courses. At any time day or night, students open the CCCS website (<http://www.ccsd.net/its/cccs/>), click on students, log into their class, and complete work in the CourseRoom.

Any student grades 9-12, enrolled in the Clark County School District may register for a class. Additionally the three Advanced Placement (AP) classes are open to students throughout the state. The cost of a class is \$80 per semester. There were four classes online for 2000-2001: AP Geopolitical Economics (12th Graders), English I Health and Math 8. For the 2001-2002 school year, classes will include American Government, English I, Health, Physics II AP, Economics AP, Geopolitical Economics AP, and Math 8.

For further information regarding Cyber Schoolhouse contact:

Tom Stanley, Instructional Technology Services
2832 East Flamingo Road Las Vegas, NV 89121
(702) 799-2039
stanleyt@interact.ccsd.net

Nevada Virtual High School (NVHS) White Pine County School District offers full service interactive online high school program open to students everywhere. Established in 1998, the school has over 55 graduates. Nevada Virtual High School is the first online high school with an online diploma program in the United States. 140 high school level classes are offered with online teacher support twelve hours daily. The students make take up to 8 online high school classes per semester and must spend a minimum of 20 hours a week online. Students participate from home, office, or public library. The service is available 24 hours a day, seven days a week, 365 days a year. Online resources are available through the NVHS Access Library System. Students can conduct periodical searches, find books, read online and printout other reference materials. The school uses a combination of NovaNet and Apex interactive software. NVHS certificated and support staff are available online. Staff also makes periodic home visits to students enrolled from other states and counties.

Adult education and GED services are also available.

White Pine County students receive this public school program at no charge. Students outside White Pine pay a monthly service fee of \$340 for 10 months.

For further information about Nevada Virtual High School (NVHS) contact:

Mark Shellinger, Superintendent
Tom Beebe, Principal
700 Aultman Street Ely, NV 89301
(775) 289-2999
mark@whitepine.k12.nv.us
tombeebe@whitepine.k12.nv.us

D. Nevada Statewide Technical and Wiring Standards

**THE COMMISSION ON EDUCATIONAL TECHNOLOGY
SUB-COMMITTEE ON HARDWARE, SOFTWARE & WIRING STANDARDS
STANDARDS DOCUMENT — DRAFT IX
December 16, 1998**

QUICK REFERENCE

I. INTRODUCTION

II. SECTION-1: HARDWARE & WIRING SCOPE

III. SECTION-2: HARDWARE & WIRING STANDARDS

- Connectivity to the Internet (or WAN)
- Building Local Area Network (LAN)
- Servers
- User Workstations
- Satellite Downlink and Master Antenna Television (MATV) Distribution
- Videoconferencing
- School Library and Media Distribution
- Software Requirements

IV. SECTION-3: GLOSSARY

V. APPENDIX-A: HIGH-LEVEL FUNCTIONALITIES

- Beliefs/Assumptions
- Functional Requirements
- Practical Functionalities
 - Level-I Reference Table - (Low Tech) Highest Priority
 - Level-II Reference Table - (Mid Tech)
 - Level-III Reference Table - (High Tech)
- Implementation Requirements

INTRODUCTION

The standards defined within this document are built upon a set of functionalities that define what technology needs to do in the classroom in order to meet statewide communications needs and technology literacy challenge goals for both teachers and students. These functionalities form the foundation because technology is not a means in itself — technology serves as a tool by which specific objectives are planned and achieved. This subcommittee's task is to define the standards by which the functionalities are achieved through hardware and wiring as follows:

The Commission shall develop technical standards for educational technology and any electrical or structural appurtenances necessary thereto, including, without limitation, uniform specifications for computer hardware and wiring, to ensure that such technology is compatible, uniform and can be interconnected throughout the public schools of this state (Nevada).

The first part of this document defines the scope of hardware and wiring as they serve to meet the criteria of the high level functionalities. The second part details the scope outline as defined in part two in the form of recommended standards. The third part contains a glossary of acronyms referenced in this document. Appendix-A contains the narrative defining the high level functionalities. It should be noted that all standards contained herein serve as baseline or minimum recommendations for all schools to ensure statewide uniformity, compatibility, and access for all educators. **These standards shall also be reviewed annually to maintain consistency with state, higher education and other pertinent organizational standards.**

SECTION-1: HARDWARE, SOFTWARE & WIRING SCOPE

Hardware, software and wiring is defined according to the language contained in the Nevada Education Reform Act of 1997 as:

Educational technology and any electrical or structural appurtenances necessary thereto, including, without limitation, uniform specifications for computer hardware and wiring, to ensure that such technology is compatible, uniform and can be interconnected throughout the public schools of this state (Nevada).

The hardware, software and wiring standards include wide area network (WAN) infrastructure for connectivity to the Internet or a state wide are educational network, local area network infrastructure (LAN), server specifications, user workstations for teachers and students, instructional television, videoconferencing, software and electrical requirements in support of all these. Recommended network design components are structured to provide modularity, ease of management and flexibility for growth. This section outlines these components and sub-topics related to each:

- **Connectivity to the Internet (or WAN)**
 - Protocol
 - Bandwidth — sufficient bandwidth to accommodate services and functionalities
 - Flexibility — can accommodate new technologies as they develop and integrate into Instructional systems.
 - Recovery/redundancy
 - Security
 - Training
 - Provision of services by larger districts.

II. Local Area Network (LAN)

- j) Network type
- k) Structure
- l) Equipment location
- m) Protocol
- n) Cabling
- o) Protocol
- p) Bandwidth
- q) Shared functions
- r) Security
- s) Spare
- t) Recovery/redundancy
- u) Remote control of student workstations
- v) Training
- w) Access

III. Servers

- § Administrative
- § Instructional
- § Library
- § Media distribution
- § E-Mail/conferencing
- § Mass storage
- § Web
- § Intranet

IV. User Workstations

- l) Teacher Workstations
- m) Student Workstations
- n) Other Workstations
- o) Furniture, lab configurations
- p) Training

V. Satellite Downlink and MATV Distribution

- e) KLVX Communications Group Satellite Downlink Project
- f) Satellite Interface to Instructional Television (ITV) Distribution
- g) Master Antenna Television (MATV) System which encompasses ITV and Commercial Television or CTV

VI. Videoconferencing

- ITU-T Videoconferencing Standards

VII. School Library, Archiving and Media Distribution

- Z39.50 Information Retrieval Standard
- NRS 239.760 Treatment of Electronic Records

VIII. Software Requirements

- Network Operating System (NOS) Software
- Operating System (OS) Software
- Productivity Software
- Communications Software
- Multimedia Instructional Software
- Presentation/Publication Software

SECTION-2: HARDWARE, SOFTWARE & WIRING STANDARDS

The standards defined within this document should be viewed as minimum recommended configurations that ensure uniform, compatibility and interconnection between computers and networks statewide. Because technology changes so quickly, this document should also be viewed as a dynamic reference that adjusts to reflect current trends in innovation and implementation.

I. Connectivity to the Internet (or WAN). Wide-Area Network connectivity needs to be provided at two levels. At a district level, WAN connectivity connects all schools within a district. At a State level, a WAN connects district WAN s so that all Instructional institutions within the State can communicate with one another electronically. Options for providing WAN connectivity include:

- Basic Rate Integrated Services Digital Network, or ISDN (BRI) and a multi-protocol router for elementary schools with ISDN services available.
- Basic Rate ISDN (BRI) and a multi-protocol router for middle schools with ISDN services available.
- T1 and multi-protocol router for high schools with T1 services available.
- For schools without ISDN or T1 connectivity, dialup services at 56Kbps per modem through a network modem pool provide a viable option (one dialup line per modem is required). Other services such as switched 56K, cable modem, wireless, satellite uplink, Frame Relay, ATM, etc. are also viable options but not yet implemented as state standards.

A. *Protocol*. The International Standards Organization (ISO) proposed a model as a first step toward international standardization of the various network protocols implemented on LANs and WANs worldwide. The model is called the ISO OSI, or Open Systems Interconnections Reference Model because it deals with connecting open systems — that is, systems that are open for communication with other systems. The seven layers of this model form the framework by which open systems are designed, and TCP/IP (Transmission Control Protocol/Internet Protocol) form the required layer 4 and layer 3 OSI WAN protocols.

B. *Bandwidth*. Bandwidth must provide cost-effective scalability that will enable schools and districts to migrate toward integrated systems that support voice, video and data. Services and functionalities include but are not limited to communication through the Internet via Email, the World Wide Web and collaboration/conferencing services. Videoconferencing, a bandwidth intensive application of the Internet, can be incorporated into district technology plans but is not included as a minimum required standard of this document

- Basic Rate ISDN for elementary schools provides two channels of 64Kbps (kilobits per second) for a total of 128Kbps.
- Basic Rate ISDN for middle schools provides the same bandwidth.
- T1 for high schools provides 1.544Mbps (megabits per second).
- For schools without ISDN or T1 connectivity, dialup services provide 56Kbps per modem through a network modem pool. One dialup line per modem is required.

C. *Recovery/redundancy*. Local Internet Service Providers (ISPs) should provide some level of redundancy if their network fails. As schools and administrative facilities become more dependent on Internet services, network failures could result in data loss and/or ability to conduct business in designated timeframes.

D. *Security*. Internet security is a complex issue and should be approached with careful design. The facets of Internet security change when addressing the differences between teachers and students. Information security measures can be grouped into six layers:

- *Policy and Standards*. It is recommended that each district adopt a set of Acceptable Use Policies (AUP) to govern accessibility and use of communications resources.
- *Information Security Architecture*. A security plan defines layers of information sensitivity and availability for users on the network. Districts should construct a security plan to define what teachers and students can do and access on the information network.
- *Information Security Awareness and Education*. Teachers and students should be trained in netiquette practices to help ensure the highest level of information security and appropriate use of information technologies.
- *Information Security Technology and Products*. A variety of technologies are available to implement a security plan. These technologies come in the form of hardware and

software and provide a variety of services. Since most districts will receive services from an Internet Service Provider of some sort, the ISP should be able to provide these services according to district determined levels. The recommended minimum set of technologies is as follows:

1. *Firewall* to protect the internal network from unauthorized access from external networks
 2. *Proxy system* to govern traffic flow through the network. The proxy system can be used to define access levels for different groups of users. For example, some users such as teachers may require full access to the web whereas others such as elementary school students require some form of restricted access.
 3. *Dynamic and static IP allocation*. IP address allocation schemes determine the methods by which security breaches or inappropriate behavior can be traced to user.
 4. *User authentication*. All users of the information network should be authenticated by unique user ID and password. For larger districts, this approach could be costly and alternative means of authentication may be implemented such as in the use of seating charts and workstation usage journals or logs.
 5. *Virus Prevention*. All users are encouraged to implement procedures and protocols designed to minimize the propagation of viruses throughout State Instructional networks.
- *Auditing, Monitoring, Investigation*. Internet service providers should supply districts with their policies governing auditing, monitoring and investigation of user behavior through the network. Districts should work with their ISP to establish a mutually suitable set of monitoring activities to ensure appropriate use of communications technologies.
 - *Discipline and Enforcement*. Districts should develop a set of policies and procedures governing enforcement of acceptable use policies and discipline for inappropriate behavior.

E. *Management*. Router and security management is typically a function of the ISP but can be assigned to districts as they provide services to their schools. For districts providing services, management functions should be made accessible through the network for remote configuration.

F. *Larger Districts as Internet Service Providers*. Smaller districts should consider receiving Internet services through larger districts who provide services to their schools either through the Nevada Network or through a local ISP. Cost sharing initiatives could be established to build maximum utilization and efficiency into network use.

II. Building Local Area Network (LAN). The local area network provides connectivity to shared resources at the desktop level. The minimum recommended standard is one networked workstation per classroom.

A. *Network type.* Recommended network type IEEE Standard 802.3 Ethernet. This system delivers the greatest performance for the least cost and can be structured in a modular fashion to accommodate expansion and bandwidth upgrades.

B. *Structure.* The general network structure should be viewed as a modular hierarchy of components that deliver the largest possible bandwidth within reasonable cost tradeoffs. This structure is as follows:

10/100 Mbps Switch > 10/100 Mbps Hub > Workstation
10/100 Mbps Switch > File Server
10/100 Mbps Switch > Network router > Internet backbone

Patch panels should be used as intermediate connection points between the switches/hubs and the workstations. The panel serves to provide flexibility in device placement and portability.

C. *Bandwidth.* The general structure proposed above provides switched 100Mbps bandwidth to hubs, servers and the network router. Hubs distribute shared bandwidth to workstations and other shared devices such as printers. Hubs and switches will automatically adjust to the bandwidth provided through the workstation network interface card (NIC). NICs should be specified as 10/100 to accommodate future bandwidth expansion.

D. *Documentation.* Building networks should be documented to reflect switch/hub cable distribution, patch panel port locations, and data port locations within each room. Spare conduits and data ports should also be reflected for future growth designs.

E. *Equipment locations.* The Equipment Rooms are defined as the distribution and connection points for information flow between the backbone wiring and local and wide area networks. Power, electronic equipment including switches, hubs and routers, patch panels, cable terminations, and patch cables link voice, data and video signals, computers and other electronic devices to the LAN and ultimately to the world. Servers should be located in a secure workspace accessible only by authorized personnel.

F. *Protocol.* TCP/IP should be implemented along with any other network protocols such as IPX or AppleShare to fulfill practical functionalities outlined in this document.

G. *Cabling.* Building cabling standards should adhere to the following cabling and transmission performance specifications. Please refer to the Ohio SchoolNet K-12 Classroom Wiring Standards for comments on the use of fiber optic cable in school facilities:

- q) EIA/TIA-568. Commercial Building Telecommunications Wiring Standards
- r) EIA/TIA-569. Commercial Building Standard for Telecommunications Pathways and Spaces.
- s) EIA/TIA-606. Administration Standard for the Telecommunications Infrastructure of Commercial Buildings.
- t) EIA/TIA-607. Commercial Building Grounding and Bonding Requirements for Telecommunications.
- u) TSB-36. Technical Systems Bulletin, Additional Cable Specifications for Unshielded Twisted Pair Cables.
- v) TSB-40. Telecommunications Systems Bulletin, Additional Transmission Specifications for Unshielded Twisted-Pair (UTSP) Connecting Hardware.
- w) NEC, ANSI/NFPA 70. National Electrical Code.

Recommended minimum specifications are provided here for new classroom installations:

1. Classroom Outlet Standard:

Category 5 Cable

- a. Minimum of 1 drop with 2 physical category 5 cables connected by a 100-megabit backbone to each classroom.
- b. Tested for performance standards (refer to TSB-40)
- c. Tested for continuity and pair reversal (refer to TSB-40)
- d. All tests results should become part of the documented system.
- e. Optical fiber to the desktop is outside the scope of state recommended standards.

All installations must meet building safety, fire and electrical code requirements.

2. Classroom Wiring Standard:

Category 5 Compliant Cable

- a. Two 4 pair 24 gauge copper cables, unshielded and twisted.
- b. All conductors should be terminated at both ends.
- c. Total length not to exceed 295 feet (90 meters).
- d. Jacks and termination hardware should be installed.
- e. End-to-end test comply with standards state above.

All installations must meet building safety, fire and electrical code requirements.

3. Backbone Wiring Standard:

Optical Fiber Cable

- a. 62.5/125 um multi-mode, 12 fiber strand cable, running directly between equipment locations in multiple equipment location buildings.

- b. 8 um single mode, 12 fiber strand cable, running directly between equipment locations in multiple equipment location buildings.
- c. End-to-end tests will be performed.

All installations must meet building safety, fire and electrical code requirements.

4. Telecommunications Closet and Main Equipment Room Standards:

Category 5 Cable

-should be terminated on Category 5 termination and patch panel hardware for data.

Optical Fiber Cable

- a. Both single and multi-mode fiber strands will use ST or SC type connectors in fiber termination panels.
- b. Patch cables will be of matching mode grade and connector type.

All installations must meet building safety, fire and electrical code requirements.

5. Alternatives

Situations may arise whereby physical cabling distribution is either difficult or impossible to implement. Wireless ethernet provides an acceptable solution to situations of this nature but detailed standards are not provided at this time.

H. *Shared functions.* The building LAN should be used for administrative and Instructional functions. The LAN with shared services provides access to communications services for educators and students. This sharing of the network between services introduces some security risks that should be addressed at the district level.

I. *Security.* LAN security can be grouped into six layers as they were for WAN network security as follows:

- § *Policy and Standards.* It is recommended that each district adopt a set of Acceptable Use Policies (AUP) to govern accessibility and use of all resources on the local area network including applications, media and files distributed through local servers.
- § *Information Security Architecture.* A security plan defines layers of information sensitivity and availability for users on the network. Districts should construct a security plan to define what teachers and students can do and access on the LAN. Servers configured with users and groups and access rights and privileges should be part of the implementation solution for security architecture. All users should be authenticated with a unique user ID and password. Refer to WAN user authentication.

- § *Information Security Awareness and Education.* Teachers and students should be trained in netiquette practices to help ensure the highest level of information security and appropriate use of local area networks.
- § *Information Security Technology and Products.* A variety of technologies are available to implement a security plan. These technologies come in the form of hardware and software and provide a variety of services. Some of these services include but are not limited to:
 1. Desktop security
 2. Server configurations including user, groups, rights and privileges
 3. Segmenting
 4. Remote control of student workstations
 5. Virus prevention
 6. Backup and disaster recovery
 7. UPS, appropriate to the scale of the equipment being protected

J. *Access.* It is strongly recommended that districts consider a single point of access to the Internet. Cost savings and controlled access are important factors in determining how information is provided to users on district networks. The more access points, the greater the security risk. Requirements imposed by eRate funding should also be considered when determining access points. Other network access issues are as follows:

- Access to the LAN and ultimately to the Internet provided to educators from their homes. It is outside the scope of this document to recommend district provision of Internet services to teachers from their homes. Dialup access to LANs is costly considering the need for networked modem pools at the point of access. Districts interested in providing this level of access may consider the high school as the access point for all dialup and feeder schools.
- Access to the LAN and ultimately to the Internet provided to parents/students from their homes. Outside the scope of this document.

K. *Management.* Network management can be divided into three major categories: server configuration, change and support. Sustainment can be divided into these categories: obsolescence/refreshment, minimized impact on existing system by new technologies, and acquisition benchmarks. Districts should establish policies and procedures to govern each of these administrative functions.

III. Servers. A host of servers provide necessary services in support of stated functionalities within this standards document. All servers specified in this section are not required as minimum recommended standards, but as desired subsystems as deemed necessary by individual districts. It is important to note that servers can provide one or more services from a single computer — some services require a dedicated server whereas others may be shared on the same server. Districts should consult with server manufacturers and applications

developers for recommendations on server limitations and requirements for specific services. Some primary services provided by servers are:

- A. *Administrative*. For administrative functions such as management of student records, grades and attendance.
- B. *Instructional*. For storage of student work and teachers files. Special configurations also serve in support of curriculum projects.
- C. *Library*. For circulation, information retrieval, and database management.
- D. *Media distribution*. For distribution of multimedia resources and software. Multimedia resources may include video, CDROM, and web resources.
- E. *EMail/Conferencing*. Districts may opt to provide eMail and collaboration/conferencing services to their schools. These services require the use of a local server for mail management and conference structures.
- F. *Mass storage*. Although not a server in itself, this provides for warehousing or archiving of data information.
- G. *Centralized web server*. This server resides outside the district firewall and provides global access to information hosted therein.
- H. *Local Intranet server*. This server functions in support of intra-district projects and information sources. The server resides within the district firewall and is not accessible from the outside.
- I. *Imaging*. For large-volume conversion and storage of documentation into an imaged format.

All servers should be right-sized for estimated administrative need and user demand with sufficient expandability for speed, storage and memory.

IV. User Workstations. User workstations are the computers used by teachers and students in the schools. These workstations must be specified with a minimum level of hardware and software capability to uphold the functionalities specified within this document. These specifications serve as recommended minimum levels for replacement of existing Intel-type and Macintosh-type hardware. It is recommended that all districts utilize systems compatible with these.

A. Minimum Teacher Workstation Configuration

Replacement Systems

1. A workstation with a pointing device and optional external large screen monitor or equivalent are recommended for teachers.
2. Access to the LAN through a network interface card (NIC). Direct access to the LSN provides indirect access to the Internet if the LSN is connected through the router as specified earlier in the document.
3. Laserdisc player control capable. This typically accomplished through a serial port that comes standard with all workstations.

4. Multimedia presentation capable. Can connect to a projection device or large monitor.
5. Multimedia capable. This implies a variety of factors including sufficient expansion capability to execute state-of-the-art applications, produce graphics and productivity projects, and perform communication through the Internet. All specifications represent minimums and are most subject to change considering the rapid changes seen in technology. Components include:

- a. 200 Mhz processor
- b. 16x CDROM drive
- c. 32MB
- d. 2 GB internal hard drive

1. Modem for remote dialup access to communications resources, as needed.

B. Minimum Student Workstation Configuration

Replacement System

1. Student workstations can be placed in individual classrooms, in computer labs, library/media centers and on mobile units for ease of transport.
2. Access to the LAN through a network interface card (NIC). Direct access to the LAN provides indirect access to the Internet if the LAN is connected through the router as specified earlier in the document.
3. Multimedia capable. This implies a variety of factors including the ability to execute state-of-the-art applications, produce graphics and productivity projects, and perform communication through the Internet. All specifications represent minimums and are most subject to change considering the rapid changes seen in technology. Components include:
 - a. 200 Mhz processor
 - b. 16x CDROM drive
 - c. 32 MB
 - d. 2 GB internal hard drive

C. Minimum School Library Workstation Configuration. These workstations include units for the media specialist(s), circulation, and library systems users. It is important to note that library workstations can provide one or more services from a single computer — some services may require a dedicated workstation, circulation i.e., whereas other may be used for multiple purposes. Districts should consult with library systems manufacturers and applications developers for recommendations on workstation limitations and requirements for specific services.

Replacement Systems

1. Access to the LAN through a network interface card (NIC). Direct access to the LAN provides indirect access to the Internet if the LAN is connected through the router as specified earlier in the document.
2. Laserdisc player control capable. This is typically accomplished through a serial port that comes standard with all workstations (media specialist(s) only).
3. Multimedia presentation capable. Can connect to a projection device or large monitor.
4. Multimedia capable. This implies a variety of factors including sufficient expansion capability to execute state-of-the-art applications, produce graphics and productivity projects, and perform communication through the Internet. All specifications represent minimums and are most subject to change considering the rapid changes seen in technology. Components include:
 - a. 200 Mhz processor
 - b. 16x CDROM drive
 - c. 32 MB
 - d. 2 GB internal hard drive

D.Management. Workstation management can be divided into three major categories: support, upgrading and obsolescence. Districts should establish policies and procedures to govern each of these administrative functions through acquisition and support benchmarks, upgrade budgets, and replenishment policies and strategies.

V. Satellite Downlink and MATV Distribution. As district technologies advance from Level-I to Level-III, classrooms should be able to support access to educational resources made available through satellite, instructional television (ITV) and other video/audio distribution media.

A. KLVX Communications Group Satellite Downlink Project (reference document: RFP 98-BN-02 of the Clark County School District/KLVX Channel-10). This document was prepared by the Clark County School District to solicit proposals for satellite television receiving equipment. Technical specifications contained herein are intended to serve as a general recommended guideline for districts scheduled to receive these services — details are provided in the reference document.

1. New Downlink Site. Consists of a Parabolic satellite Antenna (remote tuning and close tolerance actuator), 1 each C-band and KU-band LNB (digital phase stable), 1 each analog satellite receiver/parabolic antenna control, 1 each Digicipher M-PEG2 digital satellite receiver, 1 each S-VHS 20 video monitor, 2 each S-VHS video recorder, and 1 each 6 equipment rack (with side panels, top, casters, 6 shelves and locking doors).
2. Existing Downlink Site. Should be upgraded to meet the same standards as new sites with regard to satellite reception in the domestic arc.

3. Specific Downlink Requirements. The output of each TVRO system shall be reconnected to the site's MATV system if so equipped.
4. Equipment (Antenna & Mount). The antenna shall be 3.7 meter in diameter capable of handling both C and Ku band. It shall be supported by a heavy duty, fully adjustable polar mount using a linear actuator arm. Alternate antennas may be proposed in the 3.7M antenna with supporting technical justification for the substitution. Feedhorn shall be a self-aligning, three or four-pole support with a preset focal distance.

C-band is defined as 3700 MHz —4200 MHz

Ku band is defined as 11.700 GHz —12.700 GHz

The antenna must be one piece and meet or exceed 2 degree spacing, C-band Gain of 42.8 dB and Ku-band Gain of +51.4 dB. It must have an F/D ratio of .30 with a focal point of (43.20in) at 19 degrees of elevation C-band antenna noise must meet or exceed 32 degrees Kelvin. The first sidelobe maximum shall be —21dB/peak for C-band and —19dB/peak. The crosspolar maximum is —30dB/peak for C-band and —30dB/peak for Ku-band. Reflective material shall be .999 or solid, no mesh or multi-petal dishes allowed. The operational wind conditional shall be 45 mph, with a survival wind 125 mph.

Complete details are provided in the reference document.

B. Satellite Interface to ITV Distribution (reference document: RFP 98-BN-02, Attachment B, of Clark County School District/KLVX).

1. Processor. SAW filtered audio/video processor for off-air or off-channel conversion. Details are provided in the reference document.
2. Video and Audio Modulator. Provide a channelized agile, heterodyne SAW filter audio/video modulator that provides a modulated video and audio RF carrier output on any single VHF, Midband, Superband, or Hyperband channel. The Agile modulator will provide a frequency agile output converter, with front panel accessible channel selection. Details are provided in the reference document.
3. Broadband CATV Amplifier. Each amplifier shall meet or exceed the specifications detailed in the above stated reference document. Details are provided in the reference document.
4. Multiplexer. Provide a low-split multiplexer for separation VHF low and high band channels. Feed the low band signal into the T8 to Ch. 6 Processor. Details are provided in the reference document.

C. Master Antenna Television (MATV) System (reference document: MATV System, Section 16750 of the Clark County School District/KLVX). The MATV System consists of two

separate systems, ITV and CTV for which minimum required specifications are provided as follows:

1. Both systems will be consist of a coaxial copper cable RF distribution system providing distribution of signal to designated rooms as determined by Room Matrix. Provide on RG-11 leg to each area of the building as needed for each system. Provide one spare headend output for Future RG-11 ITV leg to Portables.
2. Provide MATV systems as described for the total quantity of locations indicated on the Room Matrix and providing display of centralized sources. Provide monitors mounts as described herein for all science rooms and computer labs and other rooms designated on Room Matrix, Mobile carts with monitors would plug into all remaining locations.
3. All locations will utilize RF coaxial cable for distribution from and return to the headend system.
4. Antennas. Refer to the reference document for details covering VHF receiving antennas, ITFS receiver antenna and installation.
5. System Performance Requirements. The specifications contained in this section describe the minimum acceptable performance. All specifications are based on the principle that the distribution system shall cause no visible degradation of monochrome or color pictures. Aspects of performance not specifically covered herein must meet the basic criteria outlined in the reference document.

D. *Instructional Television Fixed Service (ITFS)*. New release of technical specifications is pending - will be incorporated as soon as available.

VI. Videoconferencing Requirements. Educational organizations interested in integrating videoconferencing technologies for administrative and instructional purposes should ensure that all wiring and equipment conform to ITU-T Videoconferencing Standards. Conformity to these standards will ensure the greatest compatibility between systems. The standards are listed here:

- A. *H.320. Narrow band visual telephone systems and terminal equipment — covers videoconferencing, audio, video, graphics and multipoint.*
- B. *H.261. Video coding/decoding standards*
- C. *H.221. Frame Structure (P x 64)*
- D. *H.230. Control and Indication.*
- E. *H.242. Communications*
- F. *G.711. 3KHz audio at 64, 56 or 48Kbits/sec.*
- G. *G.772. 7KHz wideband*
- H. *G.728. 3KHz audio at 16Kbits/sec.*
- I. *MCU H.243. Multipoint control standard*
- J. *JPEG Still video standard*
- K. *Encryption. Security coding B-crypt*

VII. School Library, Archiving and Media Distribution Requirements. Library information systems, including media specialist workstations, circulation workstations, library system user workstations, servers and special application software are often specialized systems purchased as integrated hardware and software. Similarly, integrated systems used for the production of archival databases are a unique area. Certain national standards have been developed to provide for the sharing of databases across multiple hardware platforms; these standards, referred to as ANSI Z39.50, should be adhered to when acquiring such specialized library systems. Similarly, the production of archival quality records is a highly specialized area. State standards which apply have been developed by the Nevada State Library and are contained in the Nevada Revised Statutes (NRS) Chapter 239. These should be followed when generating records for long term archival purposes.

Specifications for hardware for school library servers and workstations are provided in section III and IV, respectively, of this document. Depending on the manufacturer, media distribution systems can be part of the building LAN or may require additional cabling. Because of the proprietary nature of such systems, the specifications for media distribution systems as a state recommended standard will be reserved for a future iteration of this document.

The business of library and media management requires specialized use of network and information resources. Such specialized applications are well defined and are beyond the scope of this document. Districts should adhere to state and national standards that have been developed to govern specialized use of electronic resources as they apply to library systems:

- A. Z39.50. American National Standards for Information Retrieval. Z39.50 is formally known as ANSI/NISO Z39.50-1995 — Information Retrieval (Z39.50): Application Service Definition and Protocol Specification. The standard specifies a set of rules and procedures for the behavior of two systems communicating for the purposes of database searching and information retrieval. As a network application standard, Z39.50 is an open standard that enables communication between systems that run on different hardware and use different software.*
- B. NRS 239.760. Treatment of Electronic Records*
- C. NRS 239.762. Conversion of Records to Microform*
- D. NRS 239.763. Adoption of Standards by Reference*
- E. NRS 239.765-830. Use of Optical Imaging Systems*
- F. NRS 239.835. Use of a Jukebox to Store Optical Media*
- G. NRS 239.847-848. Use of a CDROM System.*

VIII. Software Requirements. All instructional computers, including both those for students and for teachers, need to be able to support the following standard software applications:

A. Networking Operating Systems Software. Instructional computers should be able to support the latest network operating software, such as the most recent releases of Novell and/or Windows NT network operating software.

B. Operating System Software. Instructional computers should be able to support the latest operating system software, such as Windows 95, the latest Macintosh operating system or Windows NT.

C. Productivity Software. Instructional computers should be able to support and integrated productivity software package, such as the latest release of Microsoft Works, Claris Works, or Corel Suite.

D. Communications Software. Instructional computers should be able to support Internet/Web browsers with a graphical user interface, such as Microsoft Explorer or Netscape. They should also have the capacity to be able to provide both internal and external e-mail access as well as district Intranet access. This includes the capability to access library/media resources.

E. Multimedia Instructional Software. Instructional computers should be able to support multimedia software applications, particularly in the core instructional areas, such as mathematics, science, social studies and reading/language arts. This includes the capability to support interactive CD-ROM technology, sound, video and simulation applications. This includes, where appropriate, adaptive multimedia software for special needs students.

F. Presentation/Publication Software. Instructional computers should be able to support multimedia presentation, desktop publishing and on-line publication software applications, such as Powerpoint, Publisher, Hyperstudio.

SECTION-3: GLOSSARY OF ACRONYMS

| | |
|--------|---|
| ANSI | American National Standards Institute |
| ATM | asynchronous transfer mode |
| AUP | acceptable use policy |
| BRI | basic rate ISDN |
| C-band | C-Band satellites operate in the 3.7 to 4.2GHz band of frequencies, and can only be received by the larger (6 +) dishes |
| CDROM | compact disk read only memory |
| CTV | commercial television |
| DB | decibel |
| EIA | Electronic Industries Alliance |
| GHz | gigahertz |

| | |
|---------|---|
| IEEE | Institute of Electrical and Electronics Engineers, Inc. |
| IPX | Novell network protocol |
| ITFS | instructional television fixed service(synonymous with ITV) |
| ISDN | integrated services digital network |
| ISO | International Standards Organization |
| ISP | internet service provider |
| ITU | International Telecommunication Union |
| ITV | instructional television |
| JPEG | Joint Photographic Experts Group |
| Kbps | kilobits per seconds (thousands of bits per second) |
| KHz | kilohertz |
| Ku-band | Ku-Band satellites operate on the 11 to 13 GHz microwave band of frequencies and can be received by dishes as small as 18 |
| LAN | local area network |
| LNB | low-noise block down converter |
| MHz | megahertz |
| MPEG | Moving Picture Experts Group |
| NEC | national electrical code |
| NFPA | National Fire Protection Association |
| NIC | network interface card |
| OS | operating system |
| OSI | open systems interconnections reference model |
| MATV | master antenna television (equivalent to ITV + CTV) |
| Mbps | megabits per second (millions of bits per second) |
| NOS | network operating system |
| RF | radio frequency |
| RFP | request for proposal |
| S-VHS | super VHS |
| TIA | Telecommunications Industry Association |
| TCP/IP | transmission control protocol/internet protocol |
| TSB | technical systems bulletin |
| TVRO | television receive only |
| UTSP | unshielded twisted pair |
| VHF | very high frequency |
| WAN | wide area network |

APPENDIX-A: HIGH-LEVEL FUNCTIONALITIES

BELIEFS/ASSUMPTIONS

Functionalities are based on a guiding set of beliefs and assumptions about what technology can and should do in Nevada classrooms. These beliefs and assumptions are the collective result of research and experience with what works and what does not. They are as follows:

1. Technology enhances learning, when applied in a planned manner involving the careful integration of training, curriculum, and hardware resources.
2. A multiplicity of educational technologies will be required to meet the wide variety of geographic and curricular needs in Nevada.
3. Technology helps cultivate communities of learners that extend beyond the boundaries of traditional classrooms.
4. Technology is not just a subject to be taught. It is a tool which helps learners complete the tasks set before them.
5. Access to interactive technology establishes connections to the worlds, creating the relevance which motivates students to remain in school.
6. Skills in using technology are essential for the successful transition from school to career, providing the ability to compete in an increasingly technological world.
7. The level of Instructional opportunity for all Nevada learners must be equal, regardless of geographical or economic status.
8. Learning is lifelong. The advantages of Instructional opportunity through technology must always be available to learners of all ages.
9. Technology contributes to an environment which stimulates participatory democracy for all citizens, supports healthy government, and fuels a rich economy.
10. Shared management and funding responsibilities for statewide education technology resources demonstrate effective collaboration among state agencies as well as within the education system.

11. Technology can provide ready access to vital Instructional information to make informed data driven decisions to improve education, increase Instructional accountability, and improve the delivery of services to students.
12. Minimum standards are established by what can be supported by each district.

FUNCTIONAL REQUIREMENTS

As mentioned before, technology is not an end in itself. It is only valuable to schools when it is properly integrated into the curriculum in a way that empowers students to learn better, teachers to teach better, and all educators to communicate and exchange resources more efficiently. Technology can and should enrich the classroom learning environment and help all students, regardless of their individual differences, learn more effectively. The following functionalities are the guiding criteria by which all hardware and wiring standards are determined and recommended and are provided in two sub-sections: practical and implementation functionalities. Practical functionalities define what educators and students need to do with the technology, implementation functionalities define design criteria to ensure the greatest utility and flexibility of the underlying infrastructure.

Practical Functionalities

What Teachers and Students Need To Do

1. Teachers and students in classrooms and library media centers should have access to technology resources that provide a wealth of educational choices. These technologies will empower the users to be able to communicate, collaborate and exchange resources within their own site as well as statewide. To meet the diverse geographic and curricular needs in the state of Nevada, a wide variety of educational technologies will be utilized including local and wide area networks for resource sharing and distribution of media resources, district Intranets and Internet applications including E-Mail and the World Wide Web, satellites, broadcast, instructional television, microwave video, audio and telephone.
 - Access a greater wealth of information and learning resources including library resources.
 - Share learning and teaching resources in a cost-effective manner.
 - Participate in cooperative learning experiences that can enrich the Instructional environment for all students whether they live in a rural or urban setting or in a high or low socioeconomic region.
2. Teachers and students should become more productive through the use of technology. Teachers will improve their ability to teach and students will improve their ability to learn through the use of productivity applications such as:

- Desktop publishing and word processing to learn to read and write more effectively.
 - Presentation tools to learn to speak, organize and present ideas.
 - Spreadsheet tools to learn to apply math and science concepts to the solving of real-world problems.
 - Database tools to learn how to effectively manage, organize and evaluate information.
 - Simulation tools to practice applying learned concepts in life-like settings.
2. Teachers and students also need to be able to develop more collaborative process-centered ways of managing instruction that can better help guide student learning and motivate them to develop their talents and skills. These tools also need to provide teachers and students with new and innovative ways to be more accountable for student achievement. These can include:
- Classroom management tools for tracking attendance and classroom learning activities.
 - Classroom gradebook packages that help teachers monitor student learning activities.
 - Classroom portfolio packages that can help students demonstrate their capability and their growth during the year by compiling the best examples of their work over a period of time.
 - Curriculum management packages that assist teachers in evaluating the effectiveness of curriculum goals and objectives and help measure student success in meeting those goals and objectives.
3. Classroom technology, through the use of specific software packages geared to specific curriculum areas, also needs to meet the instructional needs. Emphasis needs to be given to both Internet resources and to instructional software packages that address instructional goals and objectives in the following core curriculum areas:
- Reading and Language Arts
 - Mathematics
 - Social Studies
 - Science
 - Occupational Education
5. All the above practical functionalities can be summarized by a table which establishes the minimum functional requirements as Level-I entry standards for schools in the state of Nevada:

| | What Students and Teachers Can Do | Networking/ Infrastructure | Hardware | Software | Evaluation |
|--|---|--|---|--|--|
| Level I (Low Tech) Highest Priority | <ul style="list-style-type: none"> • Students have at least one hour of direct use of technology per week. • Teachers have access to a computer, printer, video display device and VCR • Teachers receive 1/2 hour a week of basic training in the use of technology. • Teachers use technology to manage instruction and communicate with parents. | <ul style="list-style-type: none"> • Equivalent of Web/Internet access available in each classroom. • Equivalent of Video and television technology available in each classroom. | <p>3. Equivalent of at least one network computer capable of Web/Internet access.</p> <p>4. Equivalent of at least one network computer has sufficient memory to run up-to-date multimedia learning software.</p> | <ul style="list-style-type: none"> • Classroom computers have up-to-date networking and operating system software. • Classroom computers have up-to-date productivity software. • Classroom should have access to video resources. • Web browser software available in all classrooms. | <p>5. Completion of installation of a networked computer and other video support technologies in each classroom.</p> <p>6. Students and teachers successful completion of a baseline test on technology concepts, applications and skills.</p> |

| | What Students and Teachers Can Do | Networking/Infrastructure | Hardware | Software | Evaluation |
|--------------------------------|--|--|--|---|--|
| Level II (Mid Tech) | <ul style="list-style-type: none"> • Students have at least two hours of direct use of technology in the classroom per week. • Teachers have access to a computer, printer, video display device and VCR in their classroom. • Teachers have training in basic technology received and are continually acquiring skills and in instructional applications. • Students and teachers use technology for some presentations, projects and desktop/online publishing. • Technology is integrated into the curriculum, as appropriate. | <ul style="list-style-type: none"> • Web/Internet access is available on more than one computer in each classroom. • Video and television technology available in each classroom. • Each room should have access to networked educational resources. • Connectivity supports student and teacher interactivity. • Connectivity supports improved communication with parents. • There is one technical support person for every 100 teachers. | <ul style="list-style-type: none"> • There is at least a ratio of five students to each computer in each classroom. • All classroom computers are capable of Web/Internet access. • All classroom computers have sufficient memory to run up-to-date multimedia learning software applications. | <ul style="list-style-type: none"> • All classroom computers have up-to-date networking and operating system software. • All classroom computers have up-to-date productivity software. • Classroom should have access to video resources. • Some curriculum-related instructional software available. • E-mail available in all classrooms. | <ul style="list-style-type: none"> • Students and teachers demonstrate minimum computer literacy. • The following areas are expected to show improvement: <ul style="list-style-type: none"> -Student attendance -Truancy statistics -Discipline referrals -Classroom participation -Student performance -School performance -Curriculum improvement • District and school accountability information published on the district Web site. |

| | What Students and Teachers Can Do | Networking/ Infrastructure | Hardware | • Software | Evaluation |
|----------------------------------|--|---|--|--|--|
| Level III (High Tech) | <ul style="list-style-type: none"> Teachers, students, administrators and parents communicate via technology. Teachers and students can select appropriate technology tools and resources when they've determined technology is useful | <ul style="list-style-type: none"> All district buildings are connected through a district WAN. All classrooms are connected to the district WAN via school LANs. Classrooms have access to worldwide library and media learning resources. Hardware, networking and software repairs are complete in three working days. There is one technical support person per every 50 teachers. Television-Closed Circuit installed capability throughout all schools. | <ul style="list-style-type: none"> There is at least a ratio of three students to each computer. Computers have sufficient memory and processor speed to run multimedia applications. Computers have network interface cards and can access and cache multimedia Web and Internet resources. Schools have access to multiple interactive learning technologies that integrate voice, video and data. | <ul style="list-style-type: none"> Students and teachers have access to up-to-date multimedia software. Students and teachers have access to Internet/Web browser and video production software needed to access multimedia resources. Students and teachers have access to e-mail, and district Intranet learning resources. Students and teachers have access to up-to-date multimedia word processing, spreadsheet, database, presentation, and desktop publication software. Students and teachers have access to up-to-date instructional software. Students and teachers have access to interactive simulation software. | <ul style="list-style-type: none"> The following areas are expected to show improvement: <ul style="list-style-type: none"> -Student attendance -Truancy statistics -Discipline referrals -Classroom participation -Student performance -School performance -Curriculum improvement -Ability to use multiple technology tools. In addition: <ul style="list-style-type: none"> Students can create a curriculum-related publication. Students can make a presentation using multimedia tools. Students can complete a curriculum-related project using multimedia tools. District and school accountability information is published on the district Web site. |

Implementation Requirements

In order to meet the functional requirements of teachers and students in classrooms and library/media centers, implementation strategies must provide for a cost effective migration path from a school's current environment toward a target environment. Implementation must provide scalable open solutions and move districts toward integrated voice, video and data technologies. These integrated solutions should encourage Instructional institutions to develop cooperative infrastructures which promote cost-effective resource sharing and consortia designed to share implementation ideas and participate in cooperative purchasing agreements which can benefit all entities.

1. Connectivity to statewide district resources should be realized through data transmission and broadcast technologies. This requires some level of Internet services and video distribution for each district. A statewide wide area and video educational resource network (WAN) may be considered for future services.
2. Connectivity to a site local area network (LAN) should provide sufficient bandwidth for shared access to the Internet and other network services for all users at the site. The minimum recommendation is one networked workstation per classroom.
3. LAN-based file servers provide the means to store and distribute resources.
4. User workstations provide the capacity and flexibility to meet practical functionalities and grow into future needs.
5. Hardware and wiring systems should be designed to be resilient to changes imposed by the addition of new technology subsystems. As new technologies emerge, demands placed on the existing infrastructure through subsystems integration should impose minimal impact on system retrofit/upgrade and/or performance.
6. All solutions recommended by this Commission should be scaleable to the size of the district and/or schools and should be sensitive to implementation costs and schedules.
7. Purchasing and procurement should be better facilitated for implementation solutions as specified by each district.
8. Design alternatives should be provided to determine cost and performance tradeoffs and economies of scale. Alternatives could include the outsourcing of services in lieu of infrastructure investment.

